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Fire Management Notes

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Fire Management Notes

An international quarterly periodical devoted to forest fire management

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Forest Service

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Short Features

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Front Cover: Maggie Mattila, first-place winner of the Michigan Interagency Wildfire Prevention Group's (Michigan Department of Natural Resources Forest Management Division) Wildfire Prevention Poster Contest, holds her winning poster. Read the stories of Maggie and the MIWPG elsewhere in this issue.

First Wildland Firefighter Specialist Academy—a Success!

Richard C. Wharton and Denny Bungarz

Administrator and training coordinator, National Fire Fighter Joint Apprenticeship and Training Program, Sacramento, CA

In January 1990, firefighters from all over the State of California arrived in Sacramento to participate in the first USDA Forest Service Wildland Firefighter Specialist Apprenticeship Program.

On January 26, 1990, 111 firefighters selected by the Forest Service's Region 5 began a 4-week intensive training program conducted by the National Fire Fighters Joint Apprenticeship and Training Program (NFFJATP). NFFJATP is sponsored by the International Association of Fire Fighters and the National Association of State Fire Marshalls and is a national apprenticeship and training program.

Need for Workforce Diversity

Region 5 (California and the Pacific Islands) is under a consent decree and civil rights policy directive to diversify the workforce in the agency to reflect more closely the diversity of people in the population. Region 5, one of the largest wildland firefighting organizations in the Nation, selected NFFJATP to assist them in recruiting and training apprentice female and minority firefighters.

Scope of Program and Opportunities

With NFFJATP assistance, the Forest Service developed an 18-working-month apprenticeship program that included 600 hours of manipulative and classroom training and a year and a half of supervised work experience. An apprentice must complete this program to become a journeyperson wildland firefighter specialist.

Nearly all of the enrolled apprentices completed Region 5's first formal training academy.

The program is registered with the Bureau of Apprenticeship and Training Standards of the U.S. Department of Labor and the State of California Division of Apprenticeship Standards and qualifies for California postsecondary credit.

Depending on experience, U.S. Forest Service apprentices were hired as GS–3 or GS–4 firefighters. Upon completion of this program, they will be promoted to GS–5 and obtain a career appointment with the agency.

The Apprentices and the Coursework

The 111 apprentices starting the 4-week program broke down into the following groups:

Group	*Male*	*Female*
Black	7	1
Asian	3	1
Hispanic	10	9
Native American	6	7
Caucasian	14	53

The training program included the following courses:

- Orientation to Region 5
- Physical Fitness Training
- I-220 Introduction to ICS
- Standards for Survival
- First Responder-CPR
- Handtool Skills
- Fire Business Management
- Portable Pumps and Equipment
- Introduction to Hazardous Materials.

The program was conducted in a Sacramento hotel with access to the County of Sacramento-American River Parkway that provided area for daily physical training and "hands-on" training with handtools, portable

Apprentices in personal protective equipment walking to field exercise area.

pumps, and hose. The students spent half of their time in the classroom and half in the field.

The apprentices were assigned to four crews, each led by an experienced Forest Service or Bureau of Land Management crew superintendent. This gave the apprentices the opportunity to experience crew dynamics and follow a top-flight crew superintendent who was a role model. Crew competition was developed in the form of group and individual awards to increase the intensity of the learning experience.

The success of the crew superintendents' leadership was evident as students with minor physical problems refused to leave their crews for recuperation in their rooms and then voluntarily engaged in physical training before and after hours almost every day.

Program Success

At graduation, the energy level was the highest longtime Forest Service employees had seen in years. A Department of Labor official at graduation exercises similarly remarked that in 25 years of attending these graduations, this was the most enthusiastic graduating class he had ever seen. Of the 111 enrollees, 107 completed the coursework; only 4 left for better job offers or inability to meet standards.

Apprentices learning how to operate portable pump.

Other Program Requirements

The apprentices go back to the national forest in Region 5 (18 in the region) where they had been hired to serve on engine, helitack, and hot shot crews for the remainder of their apprenticeship term. During that time, first-line supervisors will conduct on-the-ground training and evaluate the apprentices' ability to perform required tasks.

In addition, the Forest Service will offer another 225 hours of formal training in the following subjects:

- Local Orientation
- Fire Equipment Maintenance and Use
- Specialized Company/Crew Operations and Drills
- Power Saw Training
- Fire Behavior
- Wildland Strategy and Tactics
- Firing Equipment
- Basic Air Operations
- Driver Training
- Career Options and Enhancement

Apprentices with appropriate wildland firefighting experience will be given experience credit, not to exceed 6 months, so many of the first class will reach journeyperson status in 12 working months. Apprentices will also be given education credit if they have taken and passed any of the courses listed above within a 5-year period.

Apprentices practicing fire shelter deployment.

Many of the first class of Forest Service apprentices have had some experience, so they can reach their goal of a permanent appointment with the Forest Service within the 12-working-month period. Completion of this program gives the apprentices a chance to have a future with one of the best wildland firefighting agencies in the world.

The National Fire Fighters Joint Apprenticeship and Training Program is available to assist your agency in a program like the Forest Service's program in Region 5. For information, contact NFFJATP, 1760 Creekside Oaks Drive, Suite 150, Sacramento, CA 95833; telephone (916) 648-3000. ■

Evaluating Wildfire Prevention Programs

Donna M. Paananen, Larry Doolittle, and Linda R. Donoghue

Technical writer, USDA Forest Service, North Central Forest Experiment Station, East Lansing, MI; sociologist, Social Science Research Center, Mississippi State University, Mississippi State, MS; project leader, USDA Forest Service, North Central Forest Experiment Station, East Lansing, MI[1]

No one will deny that wildfire prevention is a major goal of wildland management agencies in the United States or that various prevention activities exist throughout the country. But little has been done to study when, where, and how prevention is evaluated.

Because of a recent study undertaken by Mississippi State University and two USDA Forest Service research work units—Fire Planning and Economics at Riverside, CA, and Atmospheric and Socioeconomic Relationships with Wildland Fire at East Lansing—this situation has changed. The primary objective of this study was to determine how U.S. agencies with wildland fire management responsibilities assess the effectiveness of their prevention efforts. With this objective in mind, researchers contacted three groups of agencies to ask them specific questions about the nature and extent of the evaluation tools they currently use. The first group consisted of the following Federal and State fire protection agencies:

- Forest Service (USDA)
- Bureau of Land Management (USDI)
- National Park Service (USDI)
- Fish and Wildlife Service (USDI)
- Bureau of Indian Affairs (USDI)
- Departments of the Air Force, Army, and Navy
- U.S. Marine Corps
- U.S. Army Corps of Engineers
- Tennessee Valley Authority
- Wildfire protection unit within the State land management agency in each of the 50 States

[1]Currently with the Forest Fire and Atmospheric Sciences Research Staff, USDA Forest Service, Washington, DC.

The second group of agencies contacted comprised fire prevention cooperatives, "keep green" associations, county fire protection agencies, and forest industries. The third group included other members of the fire service community such as the National Fire Protection Association, the National Fire Academy, the Fire Service Training Department at Oklahoma State University, Tri-Data Corporation, Pan-Educational Institute, and several other private organizations and individuals involved in fire protection activities.

Researchers will try to provide at least one yardstick, in the form of evaluation procedures, that managers can use to measure more accurately and reliably the results of their efforts.

Individuals Contacted

Researchers telephoned individuals at these agencies and asked if anyone, at any organizational level, was conducting or had recently conducted any kind of prevention evaluation activity (no matter how modest or uncomplicated) for the agency. Once those involved in wildfire prevention were identified, the callers collected basic information about the nature of the prevention program, the human-caused fire problem, and the evaluation effort. As part of the brief telephone contact (calls lasted about 15 minutes), the researchers ascertained the opinions of prevention specialists about various aspects of prevention and its evaluation.

Finally, the researchers obtained referrals to other individuals and organizations who might be involved in prevention evaluation. To ensure consistency in questions and responses, the researchers used a six-page "Fire Prevention Evaluation Survey" that was specifically designed for this research.

Of the well over 400 individuals contacted initially, nearly 90 percent (354 people) were sufficiently involved in prevention of human-caused wildfires to be interviewed. The USDA Forest Service, the largest land management agency surveyed, had the most respondents (54 percent of the total). These individuals mainly represented the Northwest (Region 6), the Northeast (Region 9), California (Region 5), and the Southeast (Region 8). Of the Forest Service respondents, only about a third indicated they conducted evaluations. In contrast, nearly half of the State people contacted reported involvement in prevention evaluation. Other Federal agencies followed with about 18 percent of their respondents reporting evaluation efforts.

Evaluated Activities

Major prevention activities evaluated by respondents include efforts designed to prevent fires caused by the following:

- Industry (usually caused by logging operations but sometimes by railroads)
- Recreationists
- Debris-burning
- Arson
- Children
- Smoking

The first three types of fires were equally apt to be evaluated, while the last two were least likely to be evaluated. The researchers speculate that prevention of industrial, recreational, and debris-burning fires was more frequently evaluated because these fires are confined to more specific areas and their causes are easier to identify than is the case with arson-, children-, or smoking-caused fires.

Primary prevention activities evaluated by respondents include:

- Mass media (e.g., radio and TV broadcasts, news releases)
- School programs
- Cooperative prevention (interagency)
- Predictions of fire occurrence
- Information booth
- Law enforcement
- Personal contacts

Media and school prevention activities were most likely to be evaluated, and law enforcement and personal contacts were least likely. The researchers speculate that the former take place in more structured situations or environments while the latter are less structured. Hazard reduction was not mentioned by the respondents as a prevention activity currently being evaluated, even though it is an important prevention effort in some areas.

Who Conducts the Prevention Programs?

Nearly all of the prevention programs being evaluated were conducted by either prevention "technicians" or prevention "specialists." Individuals occupying these kinds of positions probably would be the primary users of prevention evaluation research and development.

What Are the Evaluation Criteria?

The researchers attempted to identify the evaluation criteria or the variables that the prevention program is expected to change. As they predicted, more than 90 percent of the reported evaluations were based on changes in fire occurrence (fig. 1). Only 8 percent did not include fire occurrence as an evaluation criterion. Fire-related attitudes and knowledge were taken into account in about one-third of the evaluations, while resource loss, levels of use by the public, and fire locations were hardly considered at all. Weather was identified as a criterion by fewer than one-quarter (22 percent) of the respondents.

Next, respondents were asked to describe how the evaluation criterion they had mentioned was used to assess prevention effectiveness. In other words, was the criterion, such as fire occurrence, used to subjec-

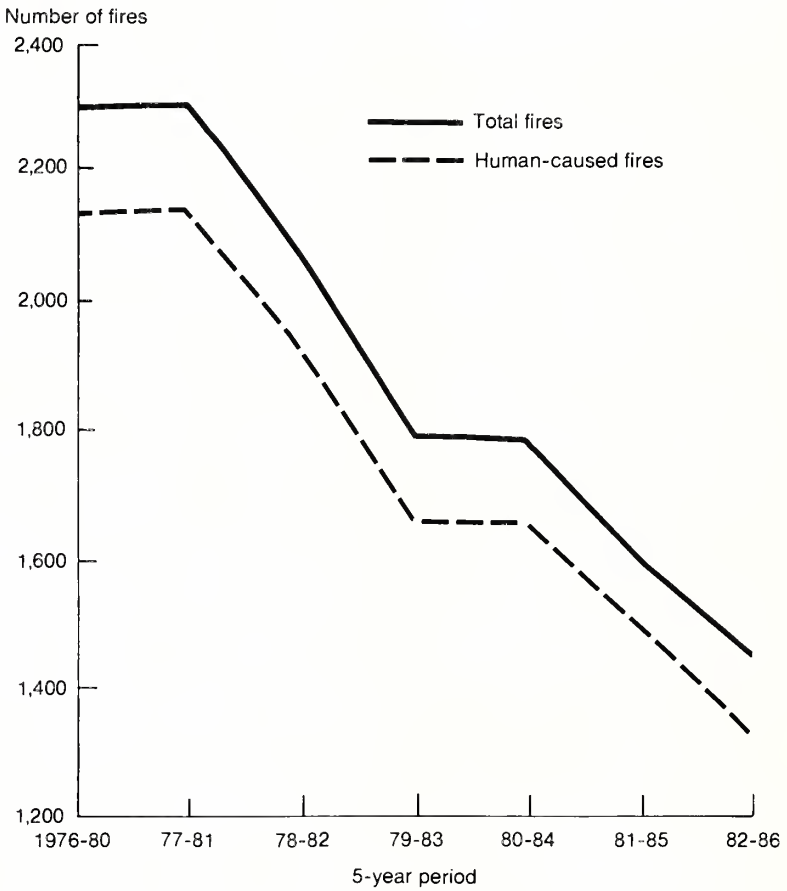


Figure 1—*This graph, plotting the number of total and human-caused fires on the national forests of the Southern Region in 5-year periods, is a typical example of how trends in fire occurrence are used to evaluate the effects of fire prevention programs. In the survey discussed in this article, 90 percent of reported prevention evaluations were based upon changes in fire occurrence.*

tively or objectively assess the effectiveness of the prevention program? Respondents reported that about one-quarter of the evaluations were mostly "subjective" while three-quarters were mostly "objective."

When asked whether their agency had a written plan or other document that describes how the prevention program or activity is evaluated, fewer than half reported that there was a written evaluation plan. But two-thirds of the respondents indicated that evaluation results were documented in an annual fire prevention report.

Slightly less than half of those who conducted evaluations were satisfied with what they were doing. As reasons for their dissatisfaction, approximately equal numbers of respondents (about 27 percent) mentioned funding, ineffectiveness of evaluation, and lack of sophistication of the evaluation method used. The researchers noted that the respondents' remaining reasons—"need to learn more" and "based wrong"—probably could be combined with the above reasons into a general heading such as "imprecise current evaluation efforts."

When asked to respond to opinion statements about fire prevention, respondents who reported evaluation efforts differed very little in their opinions from those who did not report such efforts. Some specific responses to opinion statements included:

- Most (87 percent) either agreed or strongly agreed that one of wildfire management's greatest needs is a more accurate way to evaluate the effects of prevention.
- Nearly all (97 percent) disagreed with the statement that prevention should be deemphasized.
- Most (91 percent) agreed that the influence of weather must be considered when assessing prevention effects, although earlier responses during the survey showed that many are not considering the weather's influence.
- More than half felt that effective prevention does not necessarily have to lower fire occurrence.
- Well over half (60 percent) agreed that a prevention program is not effective if it does not reduce costs and damage.

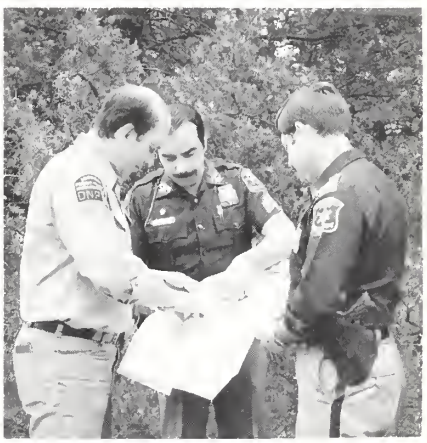
In addition, nearly two-thirds of the respondents thought that researchers often produce evaluation methods that are too complex to be used in the field. In this case, however, respondents who reported evaluation efforts were more likely to disagree with this opinion than those who did not report such efforts. Finally, about half of those contacted thought that experience is more important than science in assessing prevention effectiveness (although most acknowledged that it takes both).

Respondents' Personal Data

The last part of the telephone survey consisted of obtaining personal data about each respondent. The researchers found:

- Slightly more than half (52 percent) of the respondents had been in their present position for fewer than 5 years. Tenure in the current position, however, made little difference in whether or not respondents conducted evaluations—with one exception. Those who were in their current positions for more than 15 years were much less likely to report evaluations than their less-tenured colleagues.
- Tenure with current employer was much longer than tenure in the cur-

Most respondents did not think that a prevention program must reduce fire occurrence to be effective.



A prevention activity that was evaluated in this survey was interagency cooperation such as that illustrated here. Forest fire officer Randy McKenzie of the Michigan Department of Natural Resources plans strategy to prevent losses by fire with a local sheriff and undersheriff. (Photo: Courtesy Michigan Department of Natural Resources.)

rent position (30 years was the modal tenure with 27 cases). Tenure with a particular agency made little difference in whether or not evaluation was reported. However, respondents who had worked for their current employer for 11 to 20 years reported both the greatest number and the highest proportion of evaluation efforts with 56 and 42 percent, respectively.

- Less than half of the respondents (41 percent) came to their current position from fire specialty positions, but those who did were nearly twice as likely to report evaluations. Many of those with "nonfire" backgrounds had occupied a line position at a lower organizational level and then had moved to a staff position at the next level.
- The age distribution reflected the maturity of the group: fewer than 10 percent were under 35, and the modal category, with 45 percent of the respondents, was ages 46 to 55. As respondents' ages increased, the numbers of reports of evaluations steadily declined.
- Although most respondents were college graduates, the research revealed that as the educational level increased, the quantity of evaluation declined.

Wildfire prevention poster contests are a type of school program evaluated by fire protection agencies. Pictured are forest fire officers Joseph Soncrainte and Earl Cole (rear) and third-graders Brent Klein, Matt Martin, and Andy Englehart.

Conclusions

For the first time, we now have objective data about where evaluation is occurring (geographically and organizationally), who is doing it, what kinds of prevention programs or activities are being evaluated, and what fire prevention personnel expect evaluations to do. The next step is to collect more detailed information about existing efforts to evaluate prevention programs. By comparing documented evaluations supplied by fire prevention specialists around the country with evaluation procedures used by experts in other disciplines such as education, researchers hope to develop evaluation procedures that will better meet the needs of the wildfire prevention community.

In spite of the enormous difficulties we encounter as we try to assess the impact of our prevention programs, evaluations are as necessary now as they were in the past. As Buck *et al.* (1941) indicated nearly half a century ago, a yardstick is needed for measuring the effectiveness of prevention work. They noted that only after an accurate assessment of the benefits obtained by any given expenditure of time, money, and energy in prevention work can we evaluate the relative merits of various methods of prevention, the effectiveness towards particular classes of people, the relative importance of prevention in different areas, the need for further prevention efforts, and the advantage of prevention over presuppression and suppression activities.

Based on input from fire prevention specialists, researchers will try to provide at least one yardstick, in the form of evaluation procedures, that managers can use to measure more accurately and reliably the results of their efforts. ■

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Arsonists Do Not Set More Fires During Severe Fire Weather in Southern California

Romain Mees

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Introduction

Under severe fire weather conditions, arson is considered to be the primary cause of large wildland fires in southern California. The expression "This weather brings out the arsonists" is often heard during these conditions. To determine the accuracy of this statement, data on fire occurrence and weather at four southern California national forests (Angeles, Los Padres, Cleveland, and San Bernardino) for a 10-year period were analyzed (1975–84). The results showed that arson and nonarson fires occur at an almost equal rate under all weather conditions; however, a much higher percentage of arson fires became large fires under severe weather conditions.

The data presented here refute the idea that most arson fires occur under severe weather conditions and—at the same time—validate the utility of maintaining prevention programs during most weather conditions.

Methods

The study area is composed of four national forests located within the same fire climate region (Schroeder *et al.* 1964)—all are close geographically and can be generally described by the same wildland fuel model. Data used in this study were obtained from computerized USDA Forest Service fire reports (Form 5100–29) and daily weather observations for the years 1975–84. About 85 percent of all fires on these forests are caused by people and 21 percent of these are arson. A fire was designated as large if at least 100 persons were employed to suppress it and if the fire reached a minimum size of 100 acres (41 ha).

The weather station with the best available history of local weather observations was selected to represent all fires within each ranger district. Computation of the fire weather indexes within the National Fire-Danger Rating System (NFDRS) requires the selection of a fuel model to represent the predominant fuel type. Fuel model B (mature, heavy, dense brush) was used to calculate the burning index (BI) for the fires within the four national forests. This highly variable index has proved to be an acceptable measure of fire weather, especially under severe conditions (Mees and Bednar 1989).

BI values were computed for each fire for 7 consecutive days, which consisted of the day on which the fire was reported (designated as Day 4) and the 3 days before and after it. This work focused primarily on large fires, which were not always contained on the day they were reported. The weather observations from the 3 days after the fire described the fire weather during the containment phase of the average large fire. Weather observations from the 3 days before the fire described the fire weather leading up to all fires, large or small. If one of the seven BI values was missing, a BI based on the larger of the two neighboring values was used. The fire was eliminated from the data base if no such values existed.

Here is a challenge to a common belief.

The average BI for the 7 days was used as an overall measure of fire severity for each fire within a ranger district. All fires from the 10-year period located within a district were ranked by their 7-day average BI. The fires were then grouped into 10 equal (10 percent) BI quantile classes for each district, which were used to compare arson with nonarson fires drawn from all person-caused fires.

The area (acres) and the maximum number of personnel used on each fire were drawn from the fire reports.

Results and Discussion

Of the total 4,184 person-caused fires included in this analysis, 732 were arson and 3,452, nonarson fires for the 10-year period. The overall ratio of arson to nonarson was 21 percent for all districts (table 1). For fires with a 7-day district average BI below the 30th percentile, the ratio of arson to nonarson was lower than 21 percent. Above the 30th percentile, the ratio ranges from 20 to 28 percent.

Of 332 (87 + 76 + 79 + 90) arson fires when the district 7-day average BI was at the 60th percentile or higher (table 2), 25 (4 + 7 + 7 + 7) or 7.5 percent became large fires. For nonarson fires the percentage was 2.2 percent (7 + 10 + 4 + 8 out of 325 + 336 + 333 + 322). The ratio of these two percentages is almost 3.5 to 1 and is based on the district 7-day average rankings.

About 400 out of a possible original 4,573 fires had to be eliminated because of lack of weather data. Most of those eliminated were large fires, the fires of interest. Local weather observations were often non-

Table 1—*Arson and nonarson fires by 10 equal burning index (BI) percentile classes on four national forests in southern California*[1]

BI percentile class	Number of fires		Ratio of arson to nonarson fires	Total number of fires
	Arson	Nonarson		
0–10	50	362	0.14	412
10–20	52	360	0.14	412
20–30	62	350	0.18	412
30–40	77	335	0.23	412
40–50	76	336	0.23	412
50–60	68	344	0.20	412
60–70	87	325	0.27	412
70–80	76	336	0.23	412
80–90	79	333	0.24	412
90–100	90	322	0.28	412

[1] The left end-point is included in each interval.

existent on the days large fires were reported and contained because fire personnel are intensely occupied during these periods.

Improved fire and weather records during the course of especially large fires are a prerequisite before additional studies in fire suppression, multiple fire situations, and other areas can contribute to wildland fire management.

The 90th percentiles for the 7-day average BI for each of the 18 weather stations (districts) studied were as follows: 64, 60, 64, 150, 60, 85, 130, 59, 90, 62, 66, 73, 83, 148, 134, 130, 116, and 148. Weather stations with a 90th BI percentile that is less than 100 are located such that they are primarily under the influence of a coastal climate. Values above 100 represent weather stations primarily under the influence of a desert climate. The values represent, in order of occurrence, the Valyermo District (BI = 150) on the Angeles National Forest, the Palomar District (BI = 130) on the Cleveland National Forest, and the last five large values represent the districts on the San Bernardino National Forest.

Table 2—*Large arson and nonarson fires for 10 equal percentile classes of burning index (BI) by district 7-day average BI for four national forests in southern California.*[1]

BI percentile class	District BI Number of large fires	
	Arson	Nonarson
0–10	1	4
10–20	0	6
20–30	2	9
30–40	1	7
40–50	1	7
50–60	1	7
60–70	4	7
70–80	7	10
80–90	7	4
90–100	7	8

[1] The left end-point is included in each interval.

The district BI classification shows that the percentage of large fires among arson fires under severe conditions is much larger.

The ratio of arson to nonarson fires is almost constant when the 7-day average BI is above the 60th percentile. The number of arson fires that convert into large fires above the 60th percentile is remarkably high. The timing of arson, the fuels, and location must be addressed in prevention measures.

Conclusions

Fire managers and the public at large generally believe that the wildland arsonist is active mostly during periods of more severe fire weather. As a result, current prevention measures often tend to be designed to target the threat of arson principally during those periods. The data for the national forests in southern California, however, suggest that the incidence of arson fires in wildland areas in southern California is significant at all fire-danger levels and is essentially constant at all but the lowest.

Recommendations

By recognizing that the arsonist actually may be active with almost equal probability during any period in which fires will burn and by targeting potential arsonists in ongoing fire prevention programs, fire managers may be able to more effectively discourage potential arsonists and improve the chances of apprehending those who commit the offense. Convicted arsonists reported that an increased chance of apprehension would more likely have deterred their incendiary actions than increases of length or severity of sentence (Bradshaw and Huff 1985). The extension of effective arson prevention programs to cover periods of lower fire danger in areas where such fires are a problem could provide both the perception and fact of a higher probability of apprehension.

The considerably higher percentage of arson fires that became large during severe fire weather conditions probably reflects a tendency of arsonists to select fuels or locations where fire will be more likely to spread and not be easily controlled. In addition, the analysis indicated that arson fires tend to be set on a day when the BI is higher relative to the other days within the 7-day time period calculated for each fire (Mees unpublished). This apparent short-term temporal selectivity by the arsonist, minimal as it might be with respect to the general fire danger as indicated by this study, should be included in any further analysis of arson fires. ■

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Maggie's Poster Power

Maggie Mattila was 9 years old when she designed the poster she holds in the photograph published on the front cover of this issue of *Fire Management Notes*. Her poster won first place among Upper Peninsula third graders in the Michigan Department of Natural Resources (DNR) Wildfire Prevention Poster Competition. (The poster has also been reproduced in full color, courtesy of the National Fire Protection Association, and inserted in this *Fire Management Notes* issue.) The winners were announced in April 1990 during Wildfire Prevention Week. Maggie is now a fourth grader at Heikkinen Elementary School in Toivola, MI, which has a total enrollment of 34 children. She learned about the poster competition from her teacher, Luann Penny, who not only encouraged her students to enter but also taught them a great deal about wildland fire prevention. Because of Ms. Penny's instruction, Maggie knew enough about protecting her family's home from fire that she told her parents they should move their large woodpile away from the house.

Maggie is lucky not to have seen a wildland fire even though she lives by a large woods. From the windows of her house she regularly sees deer and coyotes in the fields. She's also seen a white wolf. Maggie has met Smokey Bear, who was present when she received her prizes from the Michigan DNR.

Those interested in evaluating prevention programs will be glad to learn that Maggie does know the four words that follow the slogan "Only you...." ■

Donna Paananen, *technical writer, North Central Forest Experiment Station, East Lansing, MI*

Michigan's Wildfire Prevention Poster Contest

The Michigan Interagency Wildfire Prevention Group (MIWPG), formed in 1981 to create a coordinated wildfire prevention effort in Michigan, started the Wildfire Prevention Poster Contest with third-grade students in 1986. For several years, winning posters were made into billboards and displayed in various locations around the State during May to increase the public's awareness of its role in preventing wildfires. Maggie Mattila of Toivola, MI, whose poster is included in this issue of *Fire Management Notes*, was the Upper Penninsula winner in 1990.

The MIWPG represents all wildfire agencies in the State: Michigan Department of Natural Resources Forest Management Division; Michigan State Police Fire Marshal Division; Michigan State Firemen's Association; Michigan Fire Chief's Association; USDA Forest Service Hiawatha, Ottawa, and Huron-Manistee National Forests and the North Central Forest Experiment Station; and the USDI National Park Service Sleeping Bear and Pictured Rocks National Lakeshores and the U.S. Fish and Wildlife Service Seney National Wildlife Refuge. ■

Fire Prevention for the 1990's—a Conference

Malcolm Gramley and Sig. Palm

USDA Forest Service, prevention specialist, Region 8, Fire and Aviation Management, Atlanta, GA, and group leader in Prevention and Training, Northeastern Area State and Private Forestry, Cooperative Fire Protection, Radnor, PA

Over the years, fire prevention nationwide has struggled to reduce the increasing cost and losses from forest fires. The approach and actions taken in an area's fire prevention program have depended on the causes of fires in that area and the interests and values of the people who lived there.

It goes without saying that wildfires from natural causes such as lightning are impossible to prevent and accidental ignitions from equipment and powerline malfunction are difficult, if not impossible, to prevent, although strategies can be developed to reduce some hazards or actions taken to mitigate the effect of disasters.

Working together helps us prevent human-caused fires.

In the Eastern United States, fire primarily stems from human activity, however. Woods arson is a traditional cause of forest fires, especially in the Southern Region. Debris burning also ranks as a major cause of wildfire throughout the East. These fires for the most part are preventable.

With increased financial capability, a large number of people are moving from their traditional urban environment to rural areas—some to establish a primary residence and others, a rural retreat. This population shift causes more homes and communities to be built near wooded areas—commonly called the wildland-urban interface—and, consequently increases the likelihood of human-caused fires and pressures on fire suppression organizations dedicated to protect forest resources rather than structures.

Our Common Problems

This change in demographics and the continuing struggle to reduce the costs and losses from fire challenge us to look for new approaches to a complex set of fire protection problems:

- The wildland-urban interface significantly complicates fire protection in many regions of the United States
- In the East, arson historically has been a significant and intransigent problem
- The use of forest lands has increased and along with it the attitudes of users have changed markedly
- Fires cross jurisdictional boundaries and involve structural, wildland, and industrial operations that require a wider range of expertise

A Need for Sharing

It was clear to us that fire protection organizations needed to find solutions to these problems through fire prevention efforts. In the East, the 33 States and 32 national forests of this section of the country were all working on fire prevention in a variety of ways. Sharing experiences, it seemed, would spread creative, inventive, and effective programs and eliminate the time waste of developing programs already worked out or minimally successful. An exchange of ideas on fire prevention would be mutually beneficial to all. We recognized the wisdom in some old sayings that "None of us is as smart as all of us" and that starting with the "wheel" unnecessarily diminishes our resources.

Out of this recognition grew an organized exchange of ideas and discussion—the first forest fire prevention conference for the Eastern United States, Fire Prevention for the 1990's, held at the Drawbridge Inn, Fort Mitchell, KY, on February 12–15, 1990. The conference was sponsored by Forest Service Regions 8 and 9, the Northeastern Area State and Private Forestry, the National Association of State Foresters, and the State Fire Chiefs of the Southeast and the Northeast.

The conference was designed to give participants a forum to describe their individual approaches to fire prevention with a special focus on the three "E's"—engineering, education, and enforcement. Presenters were researchers, judges, professors, corporation administrators, Federal and State government administrators and technical experts, and day-to-day practitioners.

The Conference Messages

The keynote speaker was Congressman Curt Weldon from the Seventh District of Pennsylvania. As Chairman of the Congressional Fire Services Caucus, Congressman Weldon is exceptionally well-versed in what the fire community needs to do to become more effective. He can say with authority that within the fire service of America resides the power to make changes in how fire protection is delivered. He sees the fire service "as a sleeping giant . . . in excess of 2 million people" among

whom there is an indescribable "special feeling." He stated, "If we could ever unite this force, there's no limit to what we could achieve in terms of dealing with your concerns and making your job easier."

The Honorable Curt Weldon, Seventh District of Pennsylvania, giving keynote address at conference.

If the fire service is to realize its potential, there are five changes the fire community must make:

- Make elected officials aware of the fire service
- Replace reaction to legislation or policy making with active participation
- Unify all groups within the fire service
- Learn to work from within the political system
- Participate in the political process

Many speakers at the conference focused on their communication efforts. Cooperative Forest Fire Prevention Program Manager Elsie Cunningham updated the group on the future of the CFFP program; and Harry R. "Punky" McClellan, national director of Smokey and Sports program, and Jerry Barney, assistant program manager of Smokey and the American Cowboy program, described the roots of these special Smokey Bear forest fire prevention programs and their target audiences. Other communication specialists discussed the production and distribution of public service announcements, the marketing of prevention programs, and how we acquire and retain information.

Milton Morris of the Virginia Department of Forestry discussed Virginia's 40-year-old elementary school assembly program and outlined its basics and some of its current programs. Professor Bruce Kuhre of the Sociology and Anthropology Department of Ohio University emphasized that an effective communications program is built on the understanding of the culture of a community, as he described the history and values of the people of the Appalachian Region.

Conference participants also benefited from the experience and expertise of people outside the fire protection community. Here are some examples of their contributions:

- Melvin Marx, chief executive officer of Nelson/Weather-Rite Corporation, spoke about corporate partnerships. He stated that "Smokey Bear is a class act ... and we like working with class acts." Mr. Marx has taken the lead in the redesign and production of the new fire safety outdoor brochure.
- Steven Getzoff, senior manager of American Express Travel-Related Service Co., Inc., provided some sound advice on trademark protection, particularly as it relates to the protection of the Smokey Bear symbol.

Rudy Wendelin, banquet speaker, with his illustrations of Smokey Bear.

- Dr. David Icove of the Federal Bureau of Investigation Academy analyzed in detail the behavioral patterns of arsonists.

Exhibits and Other Activities

In addition to the presentation, Smokey Bear licensees were invited to attend and exhibit their products. The State forestry agencies and the national forests were also given exhibit space to display some of their prevention initiatives and programs. Other activities were designed to promote interaction among individuals in an atmosphere conducive to the free and open exchange of ideas. For instance, at a working luncheon, attendees were asked to respond to these questions: What do you, as an individual or an organization, need (other than people and money) to do a more effective job in wildfire prevention? What is needed on a national level to do a more effective job in wildfire prevention? Where do you see wildfire prevention in the year 2000 (needs, problems, and so on)? This information was then made available to the Prevention Working Team of National Wildfire Coordinating Group for its use in planning future activities.

The 142 attendees at the conference represented 37 States and 4 Federal agencies, 2 Canadian provinces, and 20 national forests. Twenty-seven speakers participated in the conference. Banquet speaker Rudy Wendelin, retired Forest Service illustrator, talked about the Smokey Bear program and its development and, as he did so, drew Smokey's likeness for presentation as a momento to a lucky conference attendee.

A proceedings document has been prepared and distributed along with a questionnaire to all attendees, requesting information on how they are using or planning to use the information disseminated at the conference. Write or call Sig. Palm, Northeastern Area State and Private Forestry, Cooperative Fire Protection, 5 Radnor Corporate Center, Suite 200, 100 Matsonford Road, Radnor, PA 19087; FTS 489-4145, or (215) 975-4145, DG: S. Palm: S24A. Results of this poll are being evaluated to determine the need for, and the topics of, future conferences. At present, plans are to hold a similar conference every 2 years, as a minimum, following a format, proposed by previous attendees, that will best meet their needs in promoting forest fire prevention.

A conference of this type has been long overdue. The information presented by the speakers and the exchange of ideas and information promoted by the conference has formed a firm basis for cooperation among and between agencies involved in fire prevention. Meeting in this way was a valuable tool for making progress toward solving the perplexing and special fire prevention problems of the Eastern United States. ■

National Wildland Firefighters' Memorial Dedication: A Centennial Event

On May 8, 1991, as part of the USDA Forest Service Centennial Celebration, Forest Service Deputy Chief George Leonard will dedicate a new National Wildland Firefighters Memorial at the Aerial Fire Depot in Missoula, MT. The memorial, financed through voluntary contributions, will honor men and women who have died fighting wildland forest and range fires, with special recognition of 13 smokejumpers who died in the Mann Gulch Fire on the Helena National Forest in 1949.

The dedication, a major activity of the Forest Service Northern Region Centennial Celebration, will include tours of the smokejumper base and of a demonstration Class I Overhead Fire Camp, dedication ceremony, and reception.

The Forest Service would like to invite surviving friends and relatives of those who died at Mann Gulch to be special guests at the May 8 dedication. The names of the men who died are:

Stanley J. Reba
Silas R. Thompson
Joseph P. Sylvia
James O. Harrison
Robert J. Bennett
Newton R. Thompson
Leonard L. Piper
Eldon E. Diettert
Marvin L. Sherman
David R. Navon
Philip R. McVey
Henry J. Thol, Jr.
William J. Hellman

If you knew any of these men or have knowledge of relatives or friends, please contact Wayne Williams or Tracey Nimlos, Missoula Aerial Fire Depot, U.S. Highway 10 West, Missoula, MT 59802; telephone (406) 329-4900. If you know of relatives and friends of others who died fighting wildland fires, please also let the Forest Service know of their names. ■

North Carolina Division of Forest Resources' Efforts in the Wake of Hurricane Hugo

Rebecca Richards

Public information officer, North Carolina Division of Forest Resources, Raleigh, NC

September 22, 1989

Hurricane Hugo barrels its way through South Carolina into piedmont and western North Carolina during the early hours of Friday morning. Rainfall is heavy; winds in Charlotte, NC, are measured in excess of 75 miles per hour (121 km/h).

Residents awaken to find themselves without power; some awaken to find heavily damaged homes. Roads are blocked by a seemingly endless mass of tangled and twisted trees. Forest landowners find the timber stands they considered their nest eggs jackstrawed, lying on the ground like fallen matchsticks.

The jackstrawed timber creates an unprecedented amount of forest fire fuel, with foresters estimating that fires in areas of downed timber will have flame lengths of up to 50 feet (15 m). Fires in these areas are difficult to reach; the quagmire of downed trees keeps traditional firefighting crews and equipment from being used.

One Year Later

A year later forest landowners are still cleaning up the damage Hurricane Hugo left behind. The hurricane damaged or destroyed more than 2.7 million acres (1.1 million ha) of timber over a 26-county area, creating a potential forest fire hazard considered incalculable.

The winds from Hugo destroyed timber, but the fires from Hugo-downed timber could destroy homes and lives.

The North Carolina Division of Forest Resources is taking the forest fire threat from Hugo-downed timber seriously and, through funds from the Federal Emergency Management Agency (FEMA), is working to lessen the threat of fires in these areas during the next 5 years.

Fire Control and Mitigation Through the Counties

"Our whole effort is aimed at forest fire control and mitigation at the county level," said Coleman Doggett, senior staff forester and Hurricane Hugo administrator for the division.

The FEMA-funded personnel were integrated into the division's existing county and district organization. FEMA provided funding for mitigation efforts in the eight counties hardest hit by the storm—Mecklenburg, Union, Gaston, Lincoln, Catawba, Alexander, Wilkes, and Caldwell. Each county has a mitigation crew consisting of a forestry specialist, who contacts landowners and schedules the work, and three crew workers.

The eight counties are divided up geographically into two districts. Each district has a district coordinator who coordinates mitigation activities between the counties. "Almost all of the Hugo mitigation organization is at the district level," said Doggett. "The central office lends staff support," he said.

The division's central office in Raleigh lends logistical, planning, and budgetary support to the districts.

Most of the mitigation crews have been in place since March. "The three-person mitigation crew in each county works with handtools to clear blocked roads, which act as fire access routes, and firebreaks," Doggett said (see fig. 1). "They also clear around houses when burnable fuel and debris are within 60 feet (18 m) of a house and pose a fire threat," he said. In an 8-month period the crews have cleared more than 550 miles (885 km) of roads that can be used for firebreaks. In addition, the crews have cleared firebreaks around more than 300 homes and other structures (see fig. 2).

"We have two functions through this program—fire control and hazard mitigation," said Doggett. "All workers work on hazard mitigation unless fire danger is high, or they are needed on fires," he said. During times of high fire danger last spring the division leased two water-scooping planes—a Canadair CL–215 and a Super PBY. The division also used helicopters, patrol planes, and lead planes in the firefighting efforts.

"It is very difficult, if not impossible, to imagine the fire severity that's possible in areas of Hugo destruction."
—David Jarman, chief fire control officer, North Carolina Division of Forest Resources

Firefighters in Alexander County put one of the water-scooping planes to use March 14. The tanker was used after firefighters determined that debris and jackstrawed timber were blocking access to firelines. Alexander County Forest Ranger Billy Meadows said the fire was contained at 5 acres (2 ha) due to the tanker's efforts. No homes or structures were lost in that fire, which foresters estimate could have destroyed 600 acres

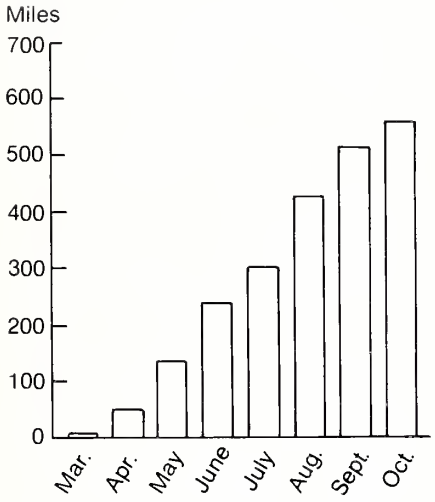


Figure 1—*Comparison by month of number of miles of firebreak cleared in 1990 through Hurricane Hugo mitigation effort.*

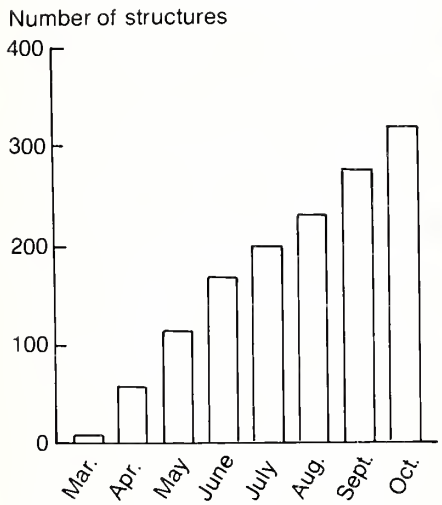


Figure 2—*Comparison by month of number of structures protected by firebreaks in 1990 through Hurricane Hugo mitigation effort.*

(243 ha) without the tanker's help.

The miles of firebreaks created by the county crews have proved beneficial, as evidenced on Rendezvous Mountain in July. When FEMA crews were assigned firebreaking projects last winter, Wilkes County Forester Ed McGee recommended that an old logging road on Rendezvous Mountain be included in the mitigation plan. The firebreak on the mountain paid off when the recently re-opened logging road stopped the head of a fire that could have burned thousands of acres. The fire was contained at 3 acres (1.2 ha).

"The head of the fire was cut off by the road we'd just cut," said McGee. "All we had to do was flank the fire and contain it," he said.

What Lies Ahead

Although frequent rainfall helped the division come through spring forest fire season with flying colors last year, the worst is expected to come in the next 3 to 5 years. "It is very difficult, if not impossible, to imagine the fire severity that's possible in areas of Hugo destruction," said David Jarman, the division's chief fire control forester. "Very little information is available on fire behavior in these extreme fuel loadings," he said.

Last year we were concerned about rapid fire spread through the dead leaves and needles left on Hugo-downed timber, Jarman said. "During succeeding years these leaves

Chris Carlson, artist illustrator, takes a close look at jackstrawed timber in Alexander County.

will drop off, making the fuel less flashy, but the larger diameter fuels (limbs and trunks) will dry out, becoming available to burn. These fuels, although not producing rapid rates of spread, will produce extreme amounts of heat and be difficult to contain. Homes close to these blowdowns could be ignited by radiant heat," Jarman said.

The severity of future forest fire seasons in areas of Hugo-downed timber will be determined by the weather and amount of burnable fuel on the ground. The Hugo mitigation plan was originally scheduled to end September 30, but with the success of the mitigation crews and the threat of fires, the program has been extended through April 30, 1991.

"We are requesting a 5-year extension for the program," Doggett said. "We believe the fire hazard will be high for the next 5 years, and we'll need diminishing resources over that period to handle the problem," he said. ■

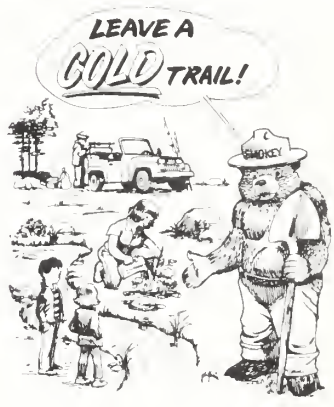
Some BIG Thank You's

The full-color fire prevention poster inserted in this issue of *Fire Management Notes* has been printed courtesy of the National Fire Protection Association (NFPA). Maggie Mattila's fine poster would not have been printed in color without NFPA help, arranged through Robert Swinford of the Fire and Aviation Management staff. Thank you, Bob and NFPA.

Thanks also go to the Michigan Wildfire Prevention Group for kindly permitting us to reproduce the winning poster in their wildfire prevention poster contest; to MIWPG executive secretary Donald Johnson for coordinating the poster's publication with MIWPG; to Donna Paananen, technical writer with the North Central Experiment Station, for energetically putting everyone involved in touch with one another and writing the story about Maggie; and finally to Maggie herself whose art may have encouraged others to be more careful and take fire safety precautions outside their home. ■

International Wildland Fire Conference Proceedings

The proceedings from the International Wildland Fire Conference held in Boston, MA, July 23–26, 1989, have recently been distributed to each person attending the conference. The conference, "Meeting Global Wildland Fire Challenges," brought together, as the proceedings publication reports, "leaders of public and private organizations from around the world to discuss issues, programs, and strategies to reduce serious wildfire losses and to promote international cooperation." Copies have also been sent to each Forest Service regional and forest supervisor, Bureau of Land Management State, and State Forester offices. ■



Reflections on 60 Years of Fire Control

Sam Ruegger

Forest ranger (retired), Department of Natural Resources, Madison, WI

One day during the 1989 April Fire Prevention Week, I received a telephone call from our local ranger, Ray Larsen, asking if I would like to spend a day with him on fire duty and get reacquainted.

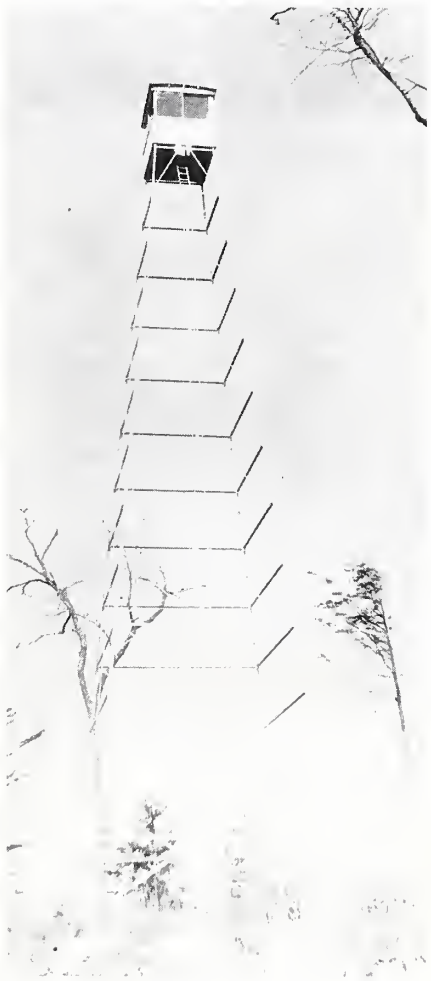
Having retired from the Wisconsin Department of Natural Resources in 1969, 21 years ago, I thought, "Why not? It would be good to see the changes." It was, I realized, 60 years ago in 1928 that I started to work for forest protection in the Radisson, WI, fire tower. As it turned out, it was a time of some controversy. In 1927, Forest Protection District 7 was set up in Rusk and Sawyer Counties. With the establishment of the district came new restrictions. To burn brush, a permit was now needed, and no uncontrolled fire was allowed. People who had just bought farms could not understand the need for a burning permit and fought these restrictions.

How I Got Started

I had been working in Chetek, WI, for several years. On one of my trips home, driving north on Highway No. 27, South of Radisson, WI, I noticed that a steel structure with a box on top had been built on a hill, 1 mile north of town.

When I got home, I asked what that "thing" was up on the hill. My folks told me it was to be a place for a person to watch for fires. Forest Ranger Lief Steiro and a crew from Hayward, WI, had erected the forest fire lookout tower.

Interested in what Forest Ranger Steiro had done, I wrote him and asked for the job. In a few days, I received a letter asking me to come for an interview. I got the job. The next spring I was on fire patrol at Radisson, WI, with my own car, a 1928 Model "A" Ford, a crew of young men, four or five backpack water cans, and a half-dozen shovels. My crew and I soon learned that to control a fire you had to hit it hard and fast, otherwise you ended up working into the night.



Radisson, WI, fire tower. The fire tower was moved in the late 1930's to a better site 4 miles away. The cutover, slash-and-burn area is now covered with 60- to 80-foot hardwoods.

Twenty Cents an Hour, Plus Lunch

The crew was paid 20 cents an hour, and I was paid $70 a month, with no reimbursement for the use of my car. Shortly after I started patrolling for fire, the Great Depression set in. Twenty cents an hour for fighting fire plus a baloney sandwich and a can of tomatoes at meal time was a lot of money.

Civilian Conservation Corps

Fire control people were taxed to the utmost trying to control fires with handtools. Then, the Civilian Conservation Corps (CCC) program came into existence and was a big turning point for fire control. We now had enough manpower to put out a fire. CCCer's worked by the month, and the sooner the fire was put out, the sooner they got off a dirty job. The CCC was also getting equipment for working outdoors. Before long, we were using CCC tractors and plows to build firelines and CCC pumpers to move water from streams and lakes onto fires. But even with this help, firefighting still required a lot of hand labor—the equipment was only roughly adaptable for the tough job of firefighting.

Equipment Advances

About this time, the State bought an abandoned roundhouse in Tomahawak, WI, where they could build firefighting units, outfitting trucks and tractors to stand up to the rugged work that was required. As the equipment improved, we were able to bring fires under control with less hand labor.

DEPARTMENT OF NATURAL RESOURCES
Forest Management Division
DEPARTMENT OF INTERIOR
United States Fish & Wildlife
MICHIGAN FIRE CHIEF'S ASSOCIATION
MICHIGAN STATE FIREMEN'S ASSOCIATION

MICHIGAN INTERAGENCY WILDFIRE PREVENTION GROUP

DEPARTMENT OF AGRICULTURE
United States Forest Service
DEPARTMENT OF STATE POLICE
Fire Marshal Division
DEPARTMENT OF INTERIOR
National Parks Service

The Michigan Interagency Wildfire Prevention Group's Prevention Poster Contest

The Michigan Interagency Wildfire Prevention Group (MIWPG), formed in 1981 to create a coordinated wildfire prevention effort in Michigan, started the Wildfire Prevention Poster Contest with third-grade students in 1986. For several years, winning posters were made into billboards and displayed in various locations around the State during May to increase the public's awareness of its role in preventing wildfires. This poster was created by Maggie Mattila of Toivola, MI, was the Upper Penninsula winner in 1990.

The MIWPG represents all wildfire agencies in the State: Michigan Department of Natural Resources Forest Management Division; Michigan State Police Fire Marshal Division; Michigan State Firemen's Association; Michigan Fire Chief's Association; USDA Forest Service Hiawatha, Ottawa, Huron-Manistee National Forests and the North Central Forest Experiment Station; and USDI National Park Service Sleeping Bear and Pictured Rocks National Lakeshores and U.S. Fish and Wildlife Service Seney National Wildlife Refuge.

Maggie Mattila was 9 years old when she designed this fire prevention poster. Her poster won first place among Upper Peninsula third graders in the Michigan DNR's Wildfire Prevention Poster Competition. The winners were announced in April 1990 during Wildfire Prevention Week. Maggie is now a fourth grader at Heikkinen Elementary School in Toivola, MI, which has a total enrollment of 34 children. She learned about the poster competition from her teacher, Luann Penny, who not only encouraged her students to enter but also taught them a great deal about wildland fire prevention. Because of Ms. Penny's instruction, Maggie knew enough about protecting her family's home from fire that she told her parents they should move their large wood pile away from the house.

Maggie is lucky not to have seen a wildland fire even though she lives near a forested area. From the windows of her house she regularly sees deer and coyotes in the fields. She's also seen a white wolf. Maggie has met Smokey Bear, who was present when she received her prizes form the Michigan DNR.

Those interested in evaluating prevention programs will be glad to learn that Maggie does know the four words that follow the slogan "Only you..."

Burn with a permit

Keep grass Short

Cut down trees close to the house

Cut lower branches of trees

Pile firewood 25 feet away from the house

Have a Cap on your Chimney

WILDLAND/URBAN INTERFACE FIRE PROTECTION INITIATIVE

Following the devastating losses from wildfire in 1985 - forty-four lives, millions of acres, and over 1400 structures lost - the United States Forest Service, the National Fire Protection Association (NFPA), and the United States Fire Admnistration (USFA) began an initiative to focus both public and fire service awareness on reducing such losses.

Joined later by the National Association of State Foresters and the wildland fire agencies of the Department of Interior, the National Wildland/Urban Interface Initiative is in the fifth year of implementation and tentative plans for the sixth year are being developed. The goals of The Initiative are:

- To create general public awareness of the problem;
- To encourage the formation of partnerships among problem solvers and interest groups; and
- To focus on the development of local solutions to the wildland/urban interface fire problem.

These remain the primary goals of the National Initiative and a fourth was added after 1987 when, for the first time ever, there were more fire fighter fatalities on wildland and vegetation fire than structural fires. The majority of these fatalities were structural firefighters from rural and volunteer fire departments. The fourth objective is:

- To promote firefighter safety in the wildland/urban interface

The issue continues to grow and the plans are to continue the national effort in support of the four objectives of the program.

The printing and distribution of this poster is one of many print and video projects undertaken by The Iniative to accomplish these goals.

The various materials produced by The Iniative are available from:

Publications Management System
Boise Interagency Fire Center
3905 Vista Avenue
Boise, ID 83705
Telephone # (208) 389-2542

Sam Ruegger, forest ranger from 1928–1969 for the State of Wisconsin.

I remember my first radio. It was located in a large heavy box not made to carry around. You would toss a rock and string over a tree limb and pull up the aerial 10 or 12 feet, and then, maybe, you could talk to a tower and get assistance. But it paid off, most times. By the time I retired in 1969, I felt I was well equipped to handle the job, and improvements were being made all the time.

Outfitted for the Job

I arrived quite early on the day I spent with Ray and soon realized that today's ranger is better outfitted for the job than I could even imagine. As far as equipment is concerned, this is a whole new ballgame.

The good old days are now!

The heavy unit today is a big 3-ton International truck, equipped with a large watertank, pump, hose, handtools, and radio. And it's painted lime yellow. I thought, "What a color for a truck!" Then I realized how visible it would be in smoke.

On the big, heavy-duty trailer that this unit pulls sat a John Deere 450 crawler tractor. What a beauty for firefighting. This tractor is twice the size of what I had used. Mounted on its front is a 7-foot blade—something that in my day was confined to dreams. The middle-buster plow attached to the back is hydraulically operated, and the whole unit is built to handle the job with ease.

He then showed me a built-in safety feature that protects the operator by activating a pump that produces an umbrella spray and mist over the cab and operator that lasts 8 minutes. He said it very effectively cooled the operator off in lots of flame.

Later in the day, a new truck was delivered to Ray's district, a 1-ton GMC diesel. I was told the State purchases these trucks with nothing but the cab mounted. Then they take them to Tomahawk where they are equipped for firefighting. Each unit is identical, so each ranger can use any truck and knows where to find the tools needed for a job. The first thing I noticed was the truck's size—it is heavy enough to carry the necessary load of equipment and supplies. I think back to my first four-wheel drive vehicle, a Jeep. It was so overloaded I am surprised we got what we did out of it. Today the ranger carries his radio in his shirt pocket and can communicate with his whole area. What a difference!

A Big Thank You

Thanks, Ray, for the invitation. It was a day well spent. I can hardly believe the changes that have taken place. Now I know—I was born 60 years too soon. ■

Glossary of Wildland Fire Management Terms

The Society of American Foresters (SAF) has recently published "Glossary of Wildland Fire Management Terms Used in the United States." The glossary is a result of an effort begun over 10 years ago by the SAF Fire Working Group.

The glossary, compiled by Guy R. McPherson, Dale D. Wade, and Clinton B. Phillips, contains 1,900 entries, including National Interagency Incident Management Systems (NIIMS) and Incident Command System (ICS) terminology. Written for North American fire managers, it is not multilingual but contains 350 terms not found in the 1986 Food and Agriculture Organization's multilingual glossary. This comprehensive, 137-page glossary is extensively cross-listed for easy use.

The glossary may be purchased for $8.50 from the Society of American Foresters, 5400 Grosvenor Lane, Bethesda, MD 20814. ■

Canadian Air Tanker and Crew in South Carolina

Gloria Green

Writer, South Carolina Forestry Commission, Columbia, SC

It's a sunny day. The sky is a clear blue, and there is a strong wind knocking against the screen door of a small trailer at the Sumter County Airbase. Inside, water is boiling in a small coffee pot. Outside, an aerial tanker sits alone on the runway like a car parked outside of a home.

The pilots are nowhere to be seen. Only an engineer roams around dividing his time between the tanker and the trailer. He finally settles on the warmth of the trailer, which has become a temporary office he shares with two other members of the crew. He pours water into a cup for instant coffee. Making a face as he swallows, he reaches for the cream.

His name is Guy Bond, and he has been at the airbase since 9 o'clock a.m. There is no television to watch and no stereo to listen to. Only the occasional sound of someone's voice on the company radio and the wind. Guy lights up a cigarette and listens to the voice again. He seemed relieved that it wasn't a call for the tanker. The pilots were away from the airbase, and he had not been able to reach them by phone.

After a few failed attempts at trying to communicate, I realized that Guy's English is only slightly better than my French. So I settle for a tour of the inside of the Canadair CL–215 firefighting aerial tanker.

The CL–215, with a three-man crew, arrived from Quebec, Canada, in February to assist the South Carolina Forestry Commission with the 1990 winter-spring fire season. It is the only air tanker in the world designed specifically for fighting fires. Air tanker use is part of the Forestry Commission's overall fire protection plan to combat forest fires in the Hurricane Hugo-damaged areas.

The air tankers are used to buy time for the ground fire crew.

With the amount of downed timber, tractors have a more difficult time than usual getting to the fires. The air tankers are used to buy time for the ground fire crew. The tankers can get to the fires quicker and start working on them before they become too large. After they're contained, the ground crew can get close enough to finish the job.

The CL–215 has a 1,400-gallon (5,299-L) water capacity. It is able to scoop water from a lake as it flies over, automatically mix a fire suppressant foaming agent, dump the mixture on the fire, and return for more water without having to land. The air tanker needs only a 3,940-foot (1,200-m) scooping distance, which includes allowances for safety heights on the approach and takes only 8 to 10 seconds to draw the water.

It can make 26 drops, totaling 34,560 gallons (130,820 L) of water before landing to refuel. It carries up to 153 gallons (579 L) of foam concentrate, which is sufficient for up to 20 foam drops per mission.

Bond arrived in South Carolina with Captain Jules Proulx and copilot Daniel Fournier January 31 and started work February 1. On their first day of work, the tanker crew had two drops in Lynchburg, SC, followed by four drops in Sumter County 2 days later and a drop in Lee County the next day.

But for Captain Proulx, seven drops in 4 days is slow business. "In Quebec, I've fought fires that have taken several planes (making) several drops to get under control," said Proulx. One fire took Proulx and 5 other air tankers almost 140 drops each to control. The CL–215 is capable of making as many as 225 separate attacks on fires in 1 day and 70 attacks in 2 hours.

The door of the trailer swings open as Proulx and Fournier enter. They have been trying to call on the radio but discover they were on a different channel. While in South Carolina, the pilots are required to stay on or near the airbase during potential fire days. Their schedule is determined by current fire weather.

In Quebec, the air firefighters are required to work a 24-hour-day, 7-day-a-week schedule April 1 to October 27. Their standby availability depends on what color code the fire season is in. The color code is used to keep fire pilots and others informed of the level of fire danger each day. For white, the crew does not have to be on standby. When the color is green, they have 1 hour to be in the air. A yellow code requires the crew to be up in 30 minutes, and with a red code, the air tanker must be in the air in 15 minutes or less. A pilot usually spends 14 days at a time at an outlying base.

The aerial tanker is part of Quebec's fleet of 21 waterbombers operated by Quebec Air Services. In addition, there are 95 pilots, 9 helicopters, 3 executive transports, an air ambulance, and a venerable DC–3.

During the off-season (October 28 to March 31), Proulx, Fournier, Bond, and other firefighters are on leave from government duties. Many of them take contracted work, such

as that with the Forestry Commission, while others pursue second jobs or spend time at home.

Proulx owns a farm outside of Quebec City and likes to make maple syrup in his extra time. "I'm pretty good," Proulx said, "but this spring will be the first time I'll make it by myself." Other things that occupy Proulx's spare time is his tree-cutting business, skiing, and spending time with his three children, ages 14, 18, and 21.

Proulx has been flying for over 20 years—15 of those as captain—and has never had a flying accident. Before becoming captain, a pilot is required to have 7 years of service. During that time, the pilot must accumulate 2,500 hours of flying, including 1,500 hours of bush flying and 1,000 hours in command of floatplanes heavier than 5,000 pounds (2,268 kg). Although he is not planning to retire anytime soon, his copilot, Daniel Fournier, wishes otherwise.

"Nothing against him," Fournier said. "I just want to be captain soon." Fournier started flying in 1972. He has been a copilot with the Quebec government since 1981. He spends much of his leave time flying commercial flights in Canada. When he's not in the air, he's on the slopes. "I love to ski and I go as often as I can."

Like Proulx, Fournier lives outside of Quebec City. Also like Proulx, Fournier is divorced and has a 10-year-old daughter. "Being away from home 40 days at a time can be hard on your home life," Proulx said. "We have to have women who understand our love of flying," Fournier added.

The Canadair Air Tanker CL–215.

Piloting the CL–215 can be a very difficult job. Many times it involves long hours, intense heat, and stable nerves to be able to fly over treetops and through thick smoke. "We get many applications from pilots every year but our turnover is very low and competition is fierce," says Ghislain Boivin, director of operations for the Quebec Air Services. "Our pilots are not a bunch of people filling in time waiting for a chance to fly with the airlines. These are dedicated professionals."

But flying isn't the only thing that draws pilots like Proulx and Fournier into their line of work. They enjoy fighting fires and the teamwork that goes into the effort. "To do what we do, you have to enjoy it," Fournier said.

There is irony in what they do. Like a soldier without a war, they wait for work others hope will never come. "It takes awhile to get used to the quiet," Fournier says of South Carolina's slow fire season, almost wishing for a major fire to break, "but you do." ■

Forest Service Aircraft on Loan to State Forestry Agencies

Francis R. Russ

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Background

Congress decided early in this century that there is a Federal interest and, therefore, a national role in protecting State and privately owned lands from fire. Annually, Federal funds are furnished to the States for this purpose and the loan of Federal Excess Personal Property (FEPP) seeks to further reduce the cost of State fire protection.

There are currently 250 FEPP fixed- and rotary-wing aircraft on loan to State forestry agencies for fire protection. Preparing these aircraft for flight and actually operating them represents a sizable State investment. The dollars, however, appear to be well spent and the use of FEPP aircraft gives most of these States something they could not otherwise afford.

Authorities

The Federal Property and Administrative Services Act of 1949, as amended, (Public Law 94–519) authorizes the USDA Forest Service to loan FEPP for fire protection. The Forest Service program is one of five exempt from paying the 25 percent of acquisition cost—the usual cost when property is furnished to a non-Federal cooperator. There are two important restrictions on USDA FEPP:

- FEPP must be used for wildland and rural fire and may be used not more than 10 percent of the time for nonfire purposes. It may never be put to personal use.
- The Forest Service must maintain ownership of the property. FEPP is subject to all USDA and Forest Service regulations and must be returned when no longer needed. Abuse of these restrictions may result in the recall of property on loan or suspension of a State cooperator from the program.

The other statutory authority for the lending of FEPP is the Cooperative Forestry Assistance Act of 1978 (Public Law 95–313). This act, which supersedes Section 2 of the Clarke-McNary Act, encourages the use of FEPP. Regulations growing out of these statutory authorities are published in the Forest Service Handbook (FSH 3109.12). Violation of the FEPP regulations may bring suspension from the program.

Acquisition of FEPP

Cooperative Agreement. There are cooperative agreements between the Forest Service regional offices and each of the 50 States and 5 territories setting forth the terms and conditions of the FEPP program. These agreements each include a clause requiring all parties to abide by the regulations in FSH 3109.12. Each State also enters into a written agreement with each of its subunits—counties, fire districts, and fire departments—governing the use of FEPP lent to them.

Air Operations Plan. When FEPP aircraft are needed, the State is required to have a current air operations plan giving the details of their pilots' qualifications and other requested information. These plans, requiring updating as circumstances change, are usually evaluated by the Forest Service FEPP manager and regional air officer. These officers, working with the State, determine the

FEPP helicopter, used for helitack, on loan to the California Department of Forestry and Fire Protection.

number, if any, of aircraft needed, the size of the aircraft, and the cost of operation.

Federal Use Is Not Justification for Obtaining FEPP. The State's request for FEPP aircraft should be based only on its need to protect State and privately owned wildlands. Federal land protection is not a justification for acquiring FEPP aircraft. It is, however, proper for the State to use FEPP aircraft for initial attack on Federal lands or anywhere, for that matter, in emergency operations where life and property are threatened.

Except for the restriction on FEPP use on Federal lands, States set their own standards for analysis and justification, since State funds will pay for the operation of the aircraft. It is the State managers' job to justify the expenditure of funds to the State legislature.

Sources of Aircraft. Federal aircraft cannot be traded in on new aircraft or sold and the funds used to purchase new aircraft, without a waiver from the General Services Administration or an authorization in the agency's budget. When Federal aircraft are no longer needed, they must (with very few exceptions) be disposed of as FEPP.

Most FEPP aircraft come from the Department of Defense (DOD), as does about 75 percent of all of our FEPP. Currently, we are trying to obtain 104 Bell UH–1H helicopters to replace earlier model Bell helicopters on loan to the State Foresters. FEPP helicopters on loan to the States are becoming costly to operate because parts are scarce. Unfortunately, a DOD budget reduction for fiscal year 1990 delayed the Army's helicopter modernization program, and, consequently, our chances of getting the Bell UH–1H helicopters in a timely fashion.

A number of aircraft formerly operated by the Forest Service are on loan to the States as are a large number of aircraft that were seized or confiscated by Federal law enforcement agencies. At one time, the law enforcement agencies were a good source of aircraft, but a few years ago legislation was passed permitting law enforcement agencies to sell their confiscated property and put the funds from the sale into their operational accounts. This source of aircraft has now nearly dried up. Congress is currently holding hearings on the possible abuse of confiscated property, however, and the way law enforcement agencies dispose of their property could again change.

Management and Use of FEPP

Basic Fire Use and How To Charge for Assistance to Others. As stated earlier, 90 percent of FEPP aircraft's use must be for fire protection (FSH 3109.12). There will always be pressures from others to borrow the FEPP aircraft or to use it for some nonfire purpose.

On occasion, there will be the opportunity to help suppress other agencies' fires or to perform a small amount of incidental work for another agency. The State should resist the temptation to charge a rate that would include depreciation, amortization, or replacement costs. The rate should only include actual operating costs, because the State did not bear the initial purchase costs.

FEPP is not surplus property, General Services Administration property, or State property! It is Forest Service property on loan.

Forest Service Aviation Management Role in FEPP. Forest Service Aviation Management takes an active part in seeing that the aircraft from the FEPP program is used properly and safely. Specifically, Aviation Management performs the following tasks:

- Reviews State aviation operation plans for compliance with USDA Forest Service and State excess property directives.
- Helps establish minimum standards for pilot qualifications and the maintenance of FEPP aircraft.
- Coordinates or establishes an approved source of parts for FEPP aircraft, such as the U.S. Army. All State operators of excess property aircraft should be wary of acquiring counterfeit aircraft parts.

Forest Service Aviation Management also contributes to the successful use of FEPP aircraft in the Cooperative Fire Protection Program. Aviation Management provides assistance in the selection, identification, and acquisition of FEPP aircraft used for the fire management mission and, upon request, assists in the management of State aviation operations. In its cooperative role, Aviation Management has many responsibilities:

- Upon request, assists in the development of a State cooperator's aviation safety programs.
- Provides aviation expertise or assistance as requested.
- Upon request, assists in the man-

agement of a State cooperator's aviation operations.

- Determines if a State cooperator meets comparable aviation standards for Forest Service use.
- Approves a State cooperator's aircraft for Forest Service missions.

Cannibalization of FEPP. Here are some guidelines for removal of parts, or "cannibalizing" as it's commonly known, of FEPP:

- Before equipment can be cannibalized, requests must first be submitted to the Forest Service regional office.
- Contrary to popular belief, cannibalization is a form of use and not of disposal. Because FEPP aircraft are usually early vintage, it is often necessary to remove parts from one aircraft to keep another flying.
- Cannibalization seldom uses everything, and there is still a carcass requiring disposal.

Logistics Support Agreement. There is an agreement for parts support between the Forest Service and the U.S. Army Aviation Command in St. Louis, MO. Other military installations are usually willing to sell to Federal and State agencies parts and overhauling services for aircraft on FEDSTRIP/MILSTRIP orders to which Federal and State agencies have access.

Accident and Negligence Reporting. States are required to report to the Forest Service aircraft accidents and incidents (near accidents). This is for the protection of both the State and Federal agencies. Negligence resulting in damage to FEPP subjects the State employee to State administrative rules, as stated in the FEPP cooperative agreement and FSH 3109.12.

Monitoring. Periodically the General Accounting Office, the USDA Office of the Inspector General, the Forest Service, and the State organization audit or review the use of FEPP. This behooves all parties in the FEPP program to run a clean FEPP program. We are asking States to do more documented formal reviews and audits of their FEPP programs. This is one of the costs of this program—and we emphasize—there are costs to using FEPP.

Title to FEPP

The question is often asked, "Why don't we give title or ownership of FEPP over to States?" The answer is quite straightforward: The law says we can't! If the law was changed to allow for transfer of title, other desirable conditions might also be lost. For instance, the States would probably then have to pay the 25 percent of acquisition cost. Further, keeping Federal title makes obtaining FEPP more likely and, when used for fire, it can be used indefinitely.

Disposal

Time-Life Parts. The State forestry agencies receive a number of aircraft parts through the FEPP program and sometimes remove parts from one FEPP aircraft to repair the other. If a part is not rebuildable, the State should deface that part in such a way it cannot be marketed by an unscrupulous dealer or it should be destroyed. These actions should be taken in conjunction with the Forest Service FEPP manager.

Returned FEPP Aircraft to DOD—Active Use and Museums. After allowing some aircraft to be used in the FEPP program for as long as 15 or 20 years, sometimes the military wants the aircraft returned. It is easy to understand their interest in wanting the aircraft for a museum—the usual case—but on rare occasions a military unit will want FEPP aircraft returned to fly them. This has happened, for instance, with the de Havilland Beaver and the Grumman T–38 trainer. This not only speaks well for the aircraft but also for the way the States maintain the aircraft. ■

RXWINDOW: Fire Behavior Program for Prescribed Fire Planning

Patricia L. Andrews and Larry S. Bradshaw

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Prescribed burning can be defined as fire applied in a knowledgeable manner to forest and range fuels on a specific land area under selected weather conditions to accomplish predetermined, well-defined management objectives (Wade and Lunsford 1989). Prescribed fire is used to accomplish a variety of resource management objectives such as regenerating trees, increasing wildlife habitat, and protecting resources from wildfire (Brown 1985). Resource objectives and the methods by which these objectives will be achieved are documented by a fire prescription. The process of planning for prescribed fire is described by Brown (1985), Fischer (1978), and Martin and Dell (1978). The program RXWINDOW, which we describe here, is intended to help fire managers develop prescription windows based on desired fire behavior.

The need for a program such as RXWINDOW is evidenced by the fact that many fire managers have been using the FIRE1 program of BEHAVE to establish burning prescriptions (Andrews and Bradshaw 1987; Doren, Richardson, and Roberts 1987). Although the mathematical models in BEHAVE include some assumptions that limit their use for certain prescribed fire applications, conscientious users are able to use the prediction with some confidence.

RXWINDOW is the fifth program in the BEHAVE fire behavior prediction and fuel modeling system (Burgan and Rothermel 1984; Andrews 1986; Andrews and Chase 1989). It reverses the DIRECT, SCORCH, and MORTALITY modules in the FIRE1 program of BEHAVE. In FIRE1, you specify environmental conditions and the program calculates fire behavior. In RXWINDOW, you define acceptable ranges of fire behavior and the program determines the appropriate combinations of environmental conditions. For example, if you specify a range of flame lengths, RXWINDOW will give acceptable fuel moisture and wind limits. You can also specify ranges for desired rate of spread, intensity, or the first-order fire effects, scorch height, or tree mortality. (For simplicity we refer to all of these as fire behavior variables.)

A prescription window defines a range of conditions under which a fire can be conducted. Prescription windows are often specified by ranges of several environmental parameters (for example, 10-hour fuel moisture 6 to 16 percent, windspeed 5 to 12 miles per hour).[1] There are problems with "square" windows like this. Consider the case where one condition is out on the "hot" side (wind greater than 12 miles per hour) and another is out on the "cool" side (10-hour moisture greater than 16 percent). Rather than being two reasons *not* to burn, opposing window corner values that are "out of prescription" may actually balance one another and lead to an acceptable fire (Raybould and Roberts 1983). A square prescription window can be either too restrictive or include conditions that should actually be out of prescription.

RXWINDOW is a prescribed fire-planning tool that allows incorporation of mathematical fire behavior and fire effects models into the process.

In order to achieve the treatment objective, it is necessary to have the right kind of fire, both in terms of control and first-order fire effects. So we suggest defining the prescription in terms of acceptable fire behavior, using the prediction models to determine related environmental conditions. All combinations of environmental values that result in the specified fire behavior are then "in prescription." Defining a prescription window based on fire behavior has been called "backing into the prescription."

Figure 1 is a table from the DIRECT module of FIRE1, illustrating tradeoffs between fuel moisture and windspeed. The table shows conditions that lead to calculated flame lengths from 2 to 5 feet. Low fuel moisture contents are acceptable at low windspeeds but are out of prescription at high windspeeds.

If all situations were this simple, the FIRE1 program would be adequate for designing prescriptions. But fuel model 1 is short dead grass; there is only one category of fuel. In this example, calculations are for a head fire on flat ground. Midflame windspeed and 1-hour fuel moisture content are, therefore, the only variables involved. Other fuel models contain live and dead fuels and have multiple size classes. The area to be burned may be on a slope, causing

[1] All of the BEHAVE programs, including RXWINDOW, can be run using metric units. We use English units in the example in this paper.

wind direction to be a consideration. There is also the possibility that backing or flanking fire may be required. It is cumbersome to make multiple FIRE1 runs to define additional variables.

In FIRE1, each set of input values has a corresponding unique set of output values. This, however, is not the case in reverse. It is possible for many input value combinations to result in the same calculated fire behavior. Note that in figure 1 calculated flame length is 3 feet when 1-hour moisture content is 5 percent and midflame windspeed is 3 miles per hour and is also 3 feet when 1-hour is 9 percent and wind is 4 miles per hour. The goal in RXWINDOW is to find all of the input combinations that result in fire behavior within a user-specified acceptable range.

It is not feasible to do the mathematics to reverse the many complex equations used in the calculations. The approach we use in RXWINDOW is to simplify the problem by reducing the number of variables to be considered by treating some variables as constant and by taking advantage of relationships among variables in the mathematical fire model.

Figure 2 is an example of input for RXWINDOW. The input is divided into four sections: fire behavior constraints, site conditions, preset environmental constraints, and output table configuration. A range of acceptable values must be set for at least one of the seven fire behavior variables, although more than one variable may be constrained. In this case, we specified that we want flame length to be from 3 to 5 feet.

```
DIRECT
 1--FUEL MODEL ------------   1 -- SHORT GRASS, 1 FT (30 CM)
 2--1-HR FUEL MOISTURE, % --  4.0   5.0   6.0   7.0   8.0   9.0  10.0
 7--MIDFLAME WINDSPEED, MI/H   .0   1.0   2.0   3.0   4.0   5.0   6.0
 8--TERRAIN SLOPE, % -------   .0
 9--DIRECTION OF WIND VECTOR   .0
10--DIRECTION OF SPREAD ----   .0  (DIRECTION OF MAX SPREAD)
    CALCULATIONS
     DEGREES CLOCKWISE
      FROM THE WIND VECTOR
```

FLAME LENGTH, FT (V4.1)

1-HR MOIS (%)	MIDFLAME WIND, MI/H .0	1.0	2.0	3.0	4.0	5.0	6.0
4.0	1.2	1.6	2.3	3.2	4.1	5.0	5.9
5.0	1.1	1.5	2.2	3.0	3.9	4.8	5.6
6.0	1.1	1.4	2.1	2.9	3.8	4.6	5.4
7.0	1.1	1.4	2.0	2.8	3.6	4.4	5.2
8.0	1.0	1.3	1.9	2.6	3.4	4.1	4.9
9.0	.9	1.1	1.7	2.3	3.0	3.7	4.3
10.0	.7	.9	1.3	1.9	2.4	2.9	3.2*

* MEANS YOU HIT THE WIND LIMIT.

Figure 1—*Table from the DIRECT module of the FIRE1 program showing combinations of 1-hour fuel moisture and midflame windspeed that give flame lengths of 2 to 5 feet.*

Site conditions are assumed to be constant for an area to be burned. We will burn brush (fuel model 5) with no overstory (fuel exposed to the wind) on a 20-percent slope.

Preset environmental constraints provide the option of using information that is not a function of calculated fire behavior. In this example, the burn is to be conducted in the fall, so live fuel moisture content is preset to be from 75 to 175 percent. And, based on experience, we know that for fire control purposes we want 1-hour moisture to be at least 6 percent and 20-foot windspeed to be no more than 10 miles per hour. We also specify that we will use a head fire. RXWINDOW will not evaluate values outside of these preset conditions.

The final section of input specifies output table configurations: the variable that is to be printed in the basic prescription table and the format of the associated moisture tables. Any one of the fire behavior variables (lines 1–7) can be printed on the

```
 INPUT LIST FOR RXWINDOW

 FIRE BEHAVIOR CONTRAINTS:

 1--RATE OF SPREAD, CH/H                          *** NOT CONSTRAINED ***
 2--HEAT PER UNIT AREA, BTU/SQFT                  *** NOT CONSTRAINED ***
 3--FIRELINE INTENSITY, BTU/FT/S                  *** NOT CONSTRAINED ***
 4--FLAME LENGTH, FT                               3.0 TO     5.0
 5--REACTION INTENSITY, BTU/SQFT/M                *** NOT CONSTRAINED ***
 6--SCORCH HEIGHT, FT                             *** NOT CONSTRAINED ***
 7--TREE MORTALITY, %                             *** NOT CONSTRAINED ***

 SITE CONDITIONS:

 8--FUEL MODEL:                          5 -- BRUSH, 2 FT (60 CM)
 9--FUEL EXPOSURE TO WIND:              EXPOSED
                                        (WIND ADJUSTMENT FACTOR =   .40)
10--TERRAIN SLOPE, %                             20.0

 PRESET ENVIRONMENTAL CONSTRAINTS:

15--1-HR FUEL MOISTURE, %                         6.0 TO    20.0
16--10-HR FUEL MOISTURE, %                       *** NOT CONSTRAINED ***
18--LIVE WOODY MOISTURE, %                       75.0 TO  175.0
19--20-FT WINDSPEED, MI/H                        .0 TO    10.0
20--MIDFLAME WINDSPEED, MI/H                     *** NOT CONSTRAINED ***
21--WIND DIRECTION                               *** NOT CONSTRAINED ***
22--FIRE SPREAD DIRECTION                        HEAD

 OUTPUT TABLE CONFIGURATIONS:

23--RXWINDOW FIRE BEHAVIOR TABLE VARIABLE:  FLAME LENGTH, FEET
24--DEAD FUEL MOISTURE TABLE VARIABLE    :  1-HR FUEL MOISTURE, %
25--LIVE FUEL MOISTURE TABLE VARIABLE    :  NO TABLE FOR FUEL MODEL  5.

 SYMBIOTIC RELATIONSHIPS:

 CONSTRAINED  20-FT WINDSPEED FROM          .0 TO      10.0 MI/H
 CONSTRAINS  MIDFLAME WINDSPEED FROM        .0 TO       4.0 MI/H
 RELATIONSHIP:  FUEL MODEL & FUEL EXPOSURE TO WIND (8-9).

 CONSTRAINED       FLAME LENGTH FROM       3.0 TO       5.0 FEET
 CONSTRAINS  FIRELINE INTENSITY FROM      61.4 TO     185.9 BTU/FT/S
 RELATIONSHIP:  MATHEMATICAL FIRE MODEL.
```

Figure 2—*Example input for the RXWINDOW program.*

final prescription table, whether it is constrained or not. In this example, we chose to print flame length (line 23), the variable on which the prescription is based (line 4). The basic prescription table is based on weighted dead and live fuel moistures. Fuel moisture tables are produced when more than one size class of dead or live fuel is in a fuel model. Because fuel model 5 has only one class of live fuel, a live fuel moisture table is not necessary (line 25).

Listing of the input includes what we call symbiotic relationships. If you know one value, you can calculate the other. This example shows the relationship between 20-foot windspeed and midflame windspeed and between flame length and fireline intensity.

Figure 3 is the RXWINDOW output table that results from the input in figure 2. Output table columns are for windspeeds: 20-foot wind on the top line (2, 4, 6, 8, 10) and midflame wind on the next line (0.8, 1.6, 2.4, 3.2, 4.0). Table rows are weighted dead fuel moistures (6, 7, 8, 9, 10), which are very nearly equal to 1-hour fuel moisture. RXWINDOW provides another table that shows the relationship among 1-hour, 10-hour, and weighted dead fuel moisture.

Blank cells within the table indicate combinations of moisture and wind that result in fire behavior out of prescription, in this example, flame length less than 3 feet or greater than 5 feet.

Nonblank cells indicate fire behavior within prescription limits. The first line of information in the cell (W–DIR) is the range of wind directions. In many cells, *any* wind direction is acceptable. In others, the wind can vary from upslope (UP) to quarter upslope (QU) or cross slope (X). The codes are printed at the bottom of the table. The second line in the cell is the range of live fuel moistures (LV–FM) that are in prescription. The third line in the cell is the range of values for the table variables specified in input line 23, in this case flame length (FLAME).

The example shown in this article provides a general idea of what RXWINDOW will do for the fire specialist. But to apply the program

```
WIND SPEEDS AND WEIGHTED FUEL MOISTURES THAT RESULT IN FIRE BEHAVIOR
WITHIN PRESCRIPTION CONSTRAINTS FOR A *** HEAD FIRE ***

*** HEAD FIRE ***           (FULL WINDOW)                (VER 3.2)
========= I ---  20-FT WIND SPEED/MIDFLAME WIND SPEED, MI/H ---
WEIGHTED  I    2.0     4.0     6.0     8.0     10.0
DEAD FM % I     .8     1.6     2.4     3.2      4.0
========= I ======= ======= ======= ======= =======
 6 W-DIR  I  UP- QU   ANY     ANY     ANY     ANY
   LV-FM  I  75- 85  75-105  75-105  85-115 105-115
   FLAME  I   3-  3   3-  4   3-  5   3-  5   3-  5
--------- I ------- ------- ------- ------- -------
 7 W-DIR  I  UP- QU   ANY     ANY     ANY     ANY
   LV-FM  I  75- 75  75- 95  75- 95  75-105  95-105
   FLAME  I   3-  3   3-  4   3-  5   3-  5   4-  5
--------- I ------- ------- ------- ------- -------
 8 W-DIR  I           ANY     ANY     ANY     ANY
   LV-FM  I          75- 85  75- 85  75- 95  85- 95
   FLAME  I           3-  4   3-  4   3-  5   4-  5
--------- I ------- ------- ------- ------- -------
 9 W-DIR  I          UP- X    ANY     ANY     ANY
   LV-FM  I          75- 75  75- 85  75- 85  75- 85
   FLAME  I           3-  3   3-  4   3-  5   4-  5
--------- I ------- ------- ------- ------- -------
10 W-DIR  I                  UP- QU   ANY     ANY
   LV-FM  I                  75- 75  75- 75  75- 75
   FLAME  I                   3-  3   3-  4   4-  4
--------- I ------- ------- ------- ------- -------
UNITS/CODES FOR TABLE VALUES ARE:
     W-DIR  = WIND DIRECTION (UP=UP-SLOPE, QU=QUARTER-UP, X=CROSS,
              QD=QUARTER-DOWN, DN=DOWN-SLOPE, ANY=ANY DIRECTION)
     LV-FM  = LIVE WEIGHTED MOISTURE, PERCENT
     FLAME  = FLAME LENGTH, FEET
```

Figure 3—*Example output from the RXWINDOW program. This table results from the input in figure 2.*

properly, one must thoroughly understand it, especially the assumptions and limitations of the mathematical models and operation of the program. This is explained in detail by the authors along with examples and annotated run, in the publication "RXWINDOW: Defining Windows of Acceptable Burning Conditions Based on Desired Fire Behavior" (Andrews and Bradshaw 1990).

Forest Service users received the RXWINDOW program as an update to BEHAVE system through normal Data General procedures. Users of IBM-compatible personal computers can obtain the programs on floppy disks from Forest Resources Systems Institute (FORS), 122 Helton Court, Florence, AL 35630; telephone (205) 767-0250. The BEHAVE system, including the RXWINDOW program, is supported by Fire and Aviation Management in the Washington Office: Fire and Aviation Management, USDA Forest Service, P.O. Box 96090 Washington, DC 20090-6090; telephone (406) 329-4950 or FTS 584-4950.

RXWINDOW is a prescribed fire-planning tool that allows incorporation of mathematical fire behavior and fire effects models into the process. RXWINDOW is not a comprehensive fire prescription development system. Prediction models are not available for all aspects of prescribed fire behavior and effects, and not all available models have been included in the program. RXWINDOW reformulates models that are already in use through the FIRE1 program in BEHAVE. Development of future prescribed fire-planning systems may well be influenced by experiences gained through use of this program. Successful use of the RXWINDOW program in developing fire prescriptions depends on the experience and professionalism of prescribed fire managers. ■

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The Passamaquoddy Tribe Firefighters on The White Mountain National Forest

In December 1989, the White Mountain National Forest (WMNF) received a call from the Bureau of Indian Affairs (BIA) in Washington, DC. They had just learned the Passamaquoddy Tribe in Princeton, ME, was interested in organizing a forest firefighting crew that would be qualified to assist on fire details in the West.

The WMNF expressed a strong interest in helping the Passamaquoddy in such an effort. The Maine Forest Service indicated it would join the training effort. The BIA would provide the funding to purchase the necessary fire equipment such as Nomex® clothing and fire packs. After many discussions, it was decided to meet with the Passamaquoddy to confirm their interest, provide a broad orientation of what would need to be done, and to get acquainted.

In January, Tom Brady, Joel Hockinson, and Chad Converse of the WMNF, representatives from the BIA, and fire control officers from the Maine Forest Service Lee Field office, met with 26 interested, potential, Passamaquoddy firefighters. The Tribal Governor was also present and offered his full support. The trip was a long one—an 8-hour drive through dense fog all the way to Princeton (close to the easternmost point of the United States)—but worthwhile.

We all agreed at this initial meeting to proceed with the training. The next step was to schedule the fire coursework. The training was broken up to occur over two separate weekends in Princeton: the first in March and the second in April. The WMNF agreed to conduct Introduction to Fire Behavior (S–190) and the Incident Command System (I–220) on the first weekend. Instructors were Jay Sylvester, Tom Barton, Tom Brady, and Chad Converse. The Maine Forest Service agreed to complete the training with Basic Firefighting (S–130) on the second weekend. Steptesting or the 1.5-mile (2.4-km) run was offered over both weekends. Fifteen firefighters actually attended the first weekend while 11 completed the second.

Throughout the early spring of 1990, lots of coordination time was spent in the securing of fire equipment for the new firefighters. Although there was money available through the BIA for purchasing supplies, the first choice was to try the Excess Equipment Redistribution Program. This is administered by the Region 9 Fire Cache in Ely, MN. With the willing support and expert help from cache manager, Bob Behrner, we were able to secure much of the equipment through this source for only the price of shipping.

At this time, the Passamaquoddy have a fully qualified and eager squad of firefighters that will be called out as part of the WMNF fire crew if one is detailed off-forest. The logistics of transporting the Passamaquoddy to the northeast mobilization point in Hartford, CT, remain a challenge. This will involve either a charter flight from Bangor, if one is available when needed, or a long 6-hour bus ride. Either way, the Passamaquoddy firefighters are determined to get involved! ■

Tom Brady—*forester and assistant fire officer, USDA Forest Service, White Mountain National Forest, Laconia, NH*

Full Metal Meals[1]

Dan Cody

Freelance writer, Lake Worth, FL

Firefighters know intimately the pleasures of eating military meals—first the C-rations and the K-rations, and since 1981, Meals Ready to Eat or MRE's. Over the past 4 years, firefighters have eaten over 750,000 MRE's. Smokejumpers and firefighters carry them in their packs, and Forest Service personnel routinely stock them in service vehicles.

One fact of military life remains inviolate through the centuries—the foot soldiers' right, if not their sacred duty, to bellyache about the food.

Hannibal's troops probably complained about getting elephant stew morning, noon, and night. Napoleon's men developed a profound distaste for Russian borscht.

And countless American veterans, be they doughboys, G.I.'s, or grunts, to this day can close their eyes and recall the tiresome "taste" of those hard-to-open, harder-to-digest, C's and K's and B's and D's. The brass called them "rations." The guys in the trenches used much more colorful names.

Now, American military forces are dining on an updated version of that alphabet soup—the MRE's, or Meals Ready to Eat, which, according to the same brass before, is food for the field at last made palatable through the miracles of a technology that produced the retortable-pouch method of food preservation and cooking. MRE's, they insist, are meals just like mom used to make—since mom has joined the workforce and has had to rush home and fix supper fast.

The earliest versions of the latest in rations first went to Grenada. MRE's, now into their eighth incarnation, were staples among the troops sent to Panama last year. Against all tradition, the current MRE menus that the Pentagon passes out actually make the food sound—dare we say—appetizing. However, a tasteful critique of "military cuisine" (is that an oxymoron?) must lean on some historic perspective. Where have we been, so we'll know where we're going? How good is it now compared to then? Check it out.

When not out foraging for anything resembling edible food (plus a lot that didn't), the Continental Army subsisted on a ration which was established by Congress in 1775 and remained essentially unchanged for a century: "... one pound beef, or three-quarter pounds pork or one pound salt fish per day; one pound bread or flour per day; three pints of peas or beans per week, or vegetables equivalent ... one pint of milk per man per day ... one half pint of rice, or one pint of Indian meal, per man per week; one quart of spruce beer or cider per man per day, or nine gallons of molasses per company of 100 men per week ...."

The menu hadn't improved significantly for either side by the time of the Civil War. If anything, it was even less nutritious; certainly no more appetizing. For example, Union troops on the march were issued one pound of hardtack (a half-baked, salt-

Chow is served in Belgium to American infantrymen of Company I, 3rd Battalion, 347th Infantry Regiment, 87th Infantry Division, on their way to La Roche, France (1945).

[1]Reprinted from *SKY magazine*, April 1990: 19(4) 80–89. Permission granted by *SKY magazine* and author, Bernie Ward (aka Dan Cody). Photographs courtesy of the U.S. Army.

Against all tradition, the current MRE menus that the Pentagon passes out actually make the food sound—dare we say—appetizing.

less cracker); three-quarter pounds of salt pork or one and one-quarter pounds of what was referred to with a straight face as "fresh" meat; plus sugar, coffee, and salt.

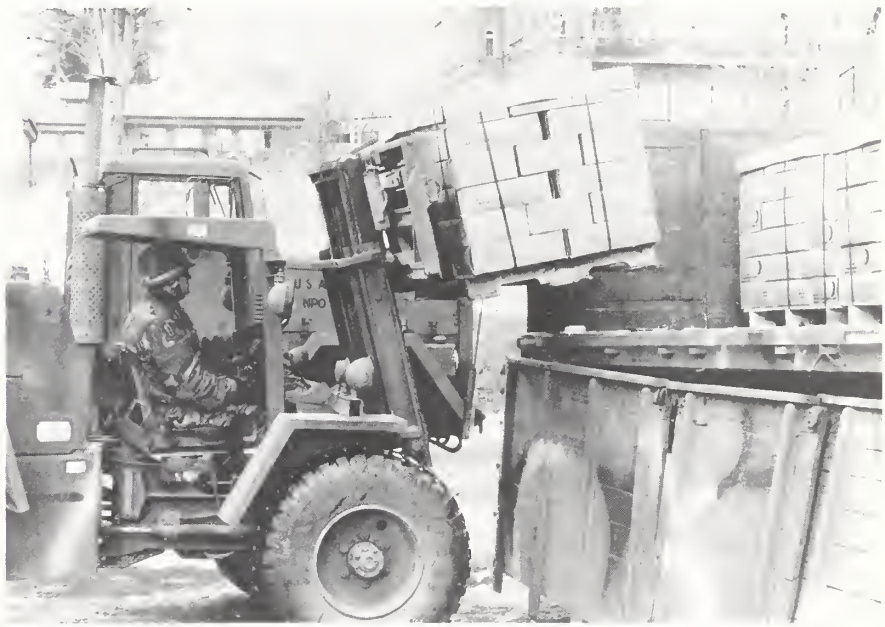
Something else had been added—desiccated vegetables, a mixture of carrots, beets, beans, onions, or whatever else was available, that was dehydrated and compressed into slabs. The men on the chow line, as they always do, quickly applied their own labels to the curious concoction. "Desecrated vegetables" was a natural; "baled hay" another.

According to one contemporary account, "... a cook would break off a piece as large as a boot top, put it in a kettle of water, and stir it with the handle of a hospital broom. When the stuff was fully dissolved, the water would remind one of a dirty brook with all the dead leaves floating around promiscuously."

One would think that duty on the frontier, where wild game and berries abounded, would be a gourmand's delight—and occasionally that was true. However, the vast distances to be patrolled and the isolated outposts frequently demanded forced marches on reduced rations—usually the supply of hardtack left over from the Civil War that the army was trying to use up, a little cold beans or hash for breakfast, and, when a mount played out, a bit of stringy horse meat.

The Spanish-American War era saw the first of the modern food technologies, which is not to say that

Members of the 3rd Platoon, Co. I, 31st RCT, 7th U.S. Infantry Division, eat their C-rations during a break in action against the Chinese Communist forces north of Hwachon, Korea (1951).



Members of Nebraska National Guard unloading cases of Meals Ready to Eat (MRE) with a 4,000 pound forklift in Vohenstrabe, West Germany (1986).

the stuff it produced tasted any better then before. Just different.

Canned beef went with the forces to Cuba, as did the ubiquitous hardtack, beans, and coffee. However, someone figured out that the grub lacked both the vitamins and the nutrition necessary to sustain anything more strenuous than turning over in bed. Consequently, an emergency field ration was developed that was supposed to be an improvement—evaporated powdered beef, parched cooked wheat, and a little bit of chocolate to make the medicine go down.

Improvements had been made by the time World War I rolled around. In his American Army Life, Col. (retired) John R. Elting wrote that in training camps "... the soldier received his usual peacetime 'garrison' ration—basically beef, flour, dry beans, prunes, fresh potatoes, butter, lard, coffee, syrup, evaporated milk, assorted condiments, vinegar, soap, and candles. Sweet potatoes and corn meal were added in 1918.

"Overseas, the 'field ration' made much use of canned meats: corned beef or corned beef hash (known as 'corned willy' or 'corned bill'), pink salmon (called 'goldfish'), and sometimes canned beef ('monkey meat')."

Each man also carried two reserve rations. In one, there were 12 ounces of bacon or salt pork, coffee, sugar, salt, and a pound of hardtack (didn't they ever use up that stuff?). Elting writes that the hardtack was well named indeed, "... needing to be fried in bacon grease or dunked in coffee or water to make it soft enough to chew."

A second, emergency ration consisted of evaporated beef powder, parched cooked wheat, sweet chocolate, and salt and pepper, combined together and shaped like a bar of soap. It carried the kind of health warning one has come to expect of the Surgeon General's Office: "Not To Be Opened Except By Order Of An Officer Or In Extremities."

Comes now the more familiar B, C, K, and D rations issued to fighting men from World War II through the Vietnam era. Few of the millions who "dined" on these delicacies can forget them—no matter how hard they try.

This was, for example, the reign of the powdered eggs. Col. Elting says that, in theory at least, this odd condiment was supposed to resemble scrambled eggs when cooked with water.

"Actually," he continues, "they were palatable enough if mixed vigorously with sufficient water—but the average sleep-befuddled KP gave them only a splash of that and half a stir, producing something resembling a moss-grown scouring pad."

Another snafu involved the development of chocolate and butter that would not melt in the South Pacific heat—but then they were promptly shipped to troops in Europe struggling through a bitterly cold winter where even fire froze.

However, the C and K rations that were the line soldiers' constant companions are what usually pop to mind when "military cuisine" is mentioned.

The C rations contained three main entrees, so to speak—meat-and-vegetable hash; meat-and-vegetable stew; and pork and beans. Other tins held coffee, candy, and "biscuits,"

A member of the 1st Platoon, Co. A, 2nd Battalion, 47th Infantry (Mechanized), 9th Infantry Division, in Vietnam eats his C-rations in the platoon's night camp (1971).

A Private First Class from the U.S. Army 82nd Airborne Division eating his Meal Ready To Eat (MRE) during the "Golden Pheasant" exercise in Honduras (1988).

which sounded more modern than hardtack, but still tasted like they'd been held in reserve since the Civil War.

While not actually a C ration itself, another food that was just as ubiquitous was Spam. If World War II didn't invent Spam, it went a long way towards popularizing the canned-meat product as a quick sandwich or supper fixer for the generations who have followed the G.I.'s. Spam usually came packed in foot-long, five-pound tins. And the resourceful foot soldiers who often dined on it for days at a time came up with ingenious ways to make it more appealing—rolled up and baked as meat loaf, or served with cloves and garnished and served as an ersatz ham.

Equally inventive was the miniature can-opener the military devised especially for the C ration tins. Known as the P–38, the folding opener was only about one and a-half inches long, but capable of dealing with the most defiant cans. Most soldiers wore the P–38 on their dogtag chains, and even today, nearly half a century later, countless little can openers still adorn veterans' key chains everywhere. With the introduction of the MRE's, the P–38 became obsolete. Army-navy surplus stores bought the versatile openers by the truckload for resale to campers and hikers.

K rations were lighter and came packaged as "breakfast, dinner, and supper," items, although truth be told, it took an expert to tell the difference. Powdered lemonade clashed with powdered bouillon in violent, internal chemical reactions, while the "meat" item for supper was really a chunk of allegedly processed cheese.

The rations revolution really hit in the late 1970's when retortable pouches finally supplanted the old olive-green packs and cans that had served America's fighting forces for 50 years. The obvious advantages were convenience and a greater variety in the kinds of food they made available. But did the stuff taste any better? What, in fact, had technology done to spice up the same old hardtack, beans, and coffee so strong "... it'll stand up and sing Yankee Doodle?"

Quite a lot, it seems. And most of it was accomplished at the U.S. Army Natick Research, Development and Engineering Center at Natick, MA.

"Military food has been a running joke for centuries," says Jerry Darsch, chief of Natick's food technology division. "Our mission is to finally do something about it. I feel that we have 780,000 consultants in the army alone who don't hesitate to tell us what they like or don't like, and we want to please every one of them.

Natick researchers have generated two primary items that are changing not only military eating habits, but the long-held attitude that army food is a necessary evil. One of those items is the food tray pack. The other is the individual MRE.

The tray pack is designed for mass field feeding when the situation permits. Each tray pack is filled with food, sealed, and thermally processed to give it a shelf life of 3 years.

For example, a half-dozen breakfast selections include: omelet with sausage and potatoes; cornmeal cereal; apple coffee cake; peaches with syrup; bread; milk; orange juice; coffee; peanut butter and jelly. Or: pork sausage links; hominy grits with cheese and bacon; spice cake, pineapple with syrup; bread; milk; grape juice; coffee; peanut butter and jelly.

Among the 14 lunch and dinner trays are: lasagna with meat sauce; green beans; fruit cocktail with syrup; chocolate pudding; bread; milk; orange beverage; coffee; peanut butter and jelly. Or chicken cacciatore; potatoes with butter sauce; carrots; applesauce; bread; milk; lemon-lime beverage; peanut butter and jelly. (Have peanut butter and jelly become the hardtack and beans of the late 20th century?)

The tray packs are intended for an army at rest, while MRE's are designed as the general-purpose combat ration to be carried and consumed in the field.

Prototypes of the MRE's in their retortable pouches underwent extensive field taste-testing from 1980 through 1983, says Darsch. Based on feedback from troops in the field, significant improvements have been made from those recommendations.

Nine of the 12 original entrees were replaced, portions increased from 5 to 8 ounces, powdered beverages like Kool-Aid were added, commercial candies (M&Ms, Tootsie Rolls) replaced the institutional sweets, and individual servings of Tabasco sauce were included because the troops said they wanted something to wake up the otherwise bland entrees.

In fact, Tabasco sauce was the first commercially identifiable product added to the MRE's and led the movement to introduce products that carry high brand identification.

Darsch says that such products are more psychologically acceptable to field soldiers when they appear as they do on a store shelf, rather than repackaged in army green. And since multitudes of soldiers have traditionally carried a nonissue hot sauce waker-upper into the field with them, Tabasco was a good place to begin the movement.

Paul McIlhenny, vice president of the Avery Island, LA, firm that produces the hot sauce, said military procurers asked his company and several others to come up with a savory in a stable container and with a shelf life of 4 to 5 years.

"We already had little one-eighth ounce bottles of Tabasco sauce that we distribute as samples or souvenirs," says McIlhenny. "They turned out to be perfect for the MRE. We've provided approximately 50 million since then, where before we were producing only a couple million of the small bottles a year."

And those 50 million bottles, McIlhenny adds, are packaged one or two to a case—not one per MRE—since a few drops go a long way in spicing up an entree.

Up to 1983, those MRE entrees were mainly ham and chicken loaf; freeze-dried pork or beef patties; and frankfurters that tasted more like Vienna sausages than hot dogs. The new and improved MREs hit the street in 1988 and consisted of such entrees as pork with rice; corn beef hash; omelet with ham; chicken stew; spaghetti with meat sauce; beef stew; ham slice; meatballs in tomato sauce; tuna and noodles; chicken and rice; and scalloped potatoes with ham.

"The feedback on the improved MRE's has been outstanding, and believe me, if the soldiers didn't like them they would say so—they always have, and in no uncertain terms," Darsch says. "As the food technology has advanced, we've been able to provide a much better product in terms of both nutrition and acceptability."

Nor are the Natick scientists resting on their laurels.

"We're making a real attempt to satisfy the tastes of a younger generation," Darsch continues. "The old take-it-or-leave-it attitude that if they're hungry they'll eat anything is gone. Maybe they will reach that stage, but by then performance will have suffered. Even though we design our rations to be nutritionally complete, they're only good if the soldier eats them."

Consequently, Natick researchers are working on prototypes of such traditional fast-food favorites as burritos, hamburgers, and hot dogs complete with buns that look, feel, and taste like they just came from the old ballpark. Without the buns, the burgers and dogs would be just more smoke and mirrors, so here again, technology has become the cook who stirs the pot. (With bread and buns can pound cake and pizza be far behind?)

"We developed an innovative technology through which we can produce shelf-stable bread," says Darsch. "In fact, that technology is so astounding that we are applying for a patent."

The process, he continues, minimizes staleness and, by reducing water content, prohibits the growth of mold and yeast on the bread. There is a fine line in controlling the water content, since too much of a reduction results in a hard, dry product. Darsch insists that the new process crowds that line without crossing over.

Does this, then, portend the end of the unlamented hardtack and biscuits?

"I'd have to say yes," Darsch replies. "This bread is absolutely amazing."

Yet another technological breakthrough looms on the Natick horizon—self-heating meals.

While MRE's can be consumed cold, they are much more palatable when heated. But soldiers on the move don't always have the luxury of a fire or other heat source. To solve this problem, Natick has come up with a flameless self heating device that brings the ration to kitchen-stove temperature within minutes.

"We are a co-patent holder of something called the Zesto-Therm," Darsch explains. "It weighs only a couple of ounces and contains a tiny wafer of corrodible magnesium alloy encased in two pieces of fiberboard, and inserted into a polymeric sleeve. The soldier merely drops the unopened MRE pouch into this sleeve next to the electrochemical heating device, adds a couple of ounces of water, which is absorbed by the pad, and in approximately 12 minutes, the heat of the entree rises 100 degrees.

"Another benefit is that if the soldier has to move before the entree is ready, he can slide it back in the sleeve and stick it in his pocket. Once the heating process begins, the food stays hot for up to an hour."

Darsch says the field testing of the new bread product and the self-heater will be completed this year. Pending

armed-services approval, the "flameless ration heater" should be available in bulk by 1991. The next logical step in the development is to place the heaters inside the MRE so they will be issued together as one package—a technology that, conceivably, has applications far beyond military use.

"I think we have made significant strides in providing highly consumable food," Darsch concludes. "But we have to keep working at it since we recognize the soldier's obligation to complain about the food."

It is, after all, one of those inalienable rights. ■

New Wildfire Suppression Curriculum in Final Review Phase

Field offices of all Federal and State wildland fire management agencies should have reeeived proposed modifications to the wildland fire training and qualifieation standards. This proposal has resulted from an extensive analysis of performanee, training, and qualifieation needs of the 85 positions in the wildfire suppression organization. The analysis, sponsored by the National Wildfire Coordinating Group and lead by the Boise Interagency Fire Center's Division of Training, has involved subject matter experts from Federal and State agencies throughout the United States. The objectives of this effort are to improve training efficiency by taking the following actions:

- Eliminating redundancy in the existing I courses
- Improving the quality of instructional materials and reducing the time required for instructor preparation
- Ensuring adequate coverage of all wildfire suppression skills
- Ensuring that qualification standards directly reflect the individual's ability to perform
- Maintaining the "all-risk" nature of the Incident Command System (ICS).

The proposal makes several significant recommendations:

- Consolidate ICS instruction into four generic I courses that ean be used by any risk area. Wildfire suppression will be contained in S courses and job aids and will be directly related to job performance as defined in position "task books" (already developed through the analysis process). S courses and job aids will, to the degree possible, be designed in sueh a manner that they can be modified or adapted by other risk areas.
- Consolidate formal classroom training with many eourses eliminated or replaced by job aids. Standard training for all unit leaders will be designed to offer various alternatives in presentation; that is, by unit, section, or all sections together.
- Base certification of trainees on prerequisite experience and performanee, not on completing a training eourse. Training courses will be available to support performance and advancement on an as-needed basis. Mandatory training eourses are reduced to a minimum.
- Extend national qualification requirements from the current strike team or task force leader level to inelude firefighter and single resource boss positions.

Seheduled for agency review sometime this year is a proposed prescribed fire curriculum that has resulted from the same type of analysis. The suppression and prescribed fire curriculum complement each other in that many of the skills identified in preseribed fire jobs ean be obtained from suppression training and experience and vice versa.

It is the hope of the agency representatives on the ICS, Training, and Preseribed Fire and Fire Effects Working Teams that, once agencies approve the proposal, development and implementation of the system ean be done over a 3- to 5-year period. There is much to be done, however, and available funding will be the determining factor.

For further information on this proposal, eontact your agency representative on the training or ICS working teams of the National Wildfire Coordinating Group. ■

Mike Munkres, *chief, Training Program Management Branch, Division of Training, Bureau of Land Management, Boise Interagency Fire Center, Boise, ID, and advisor to the National Wildfire Coordinating Group Training Working Team*

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